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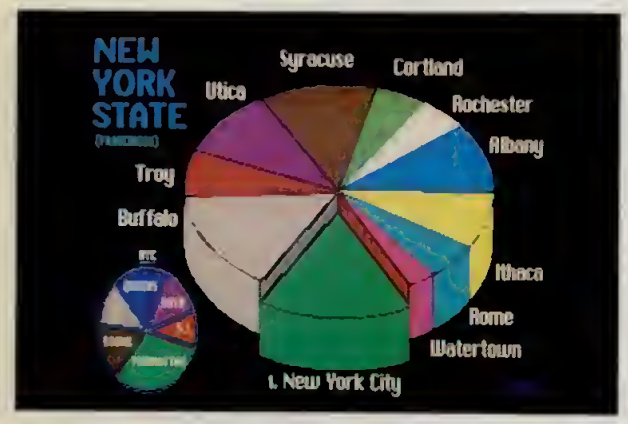

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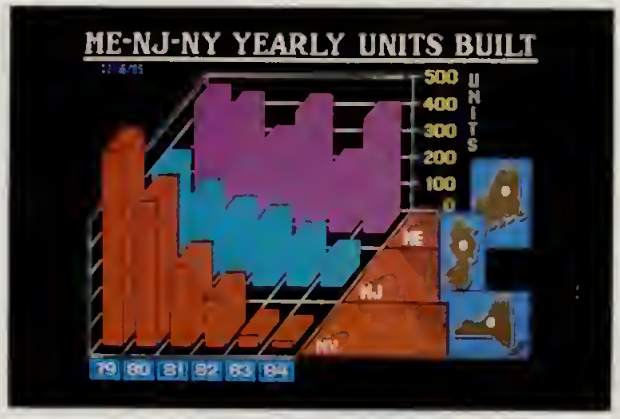

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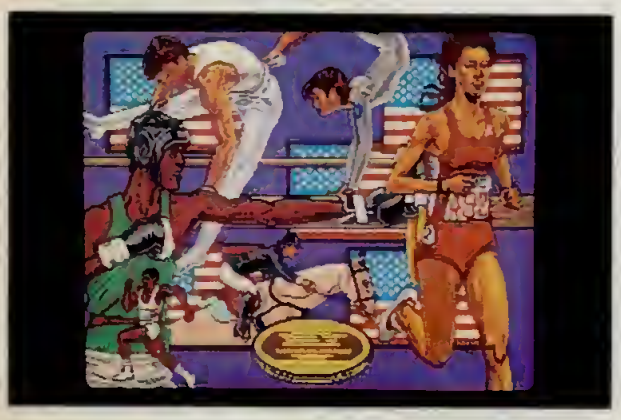

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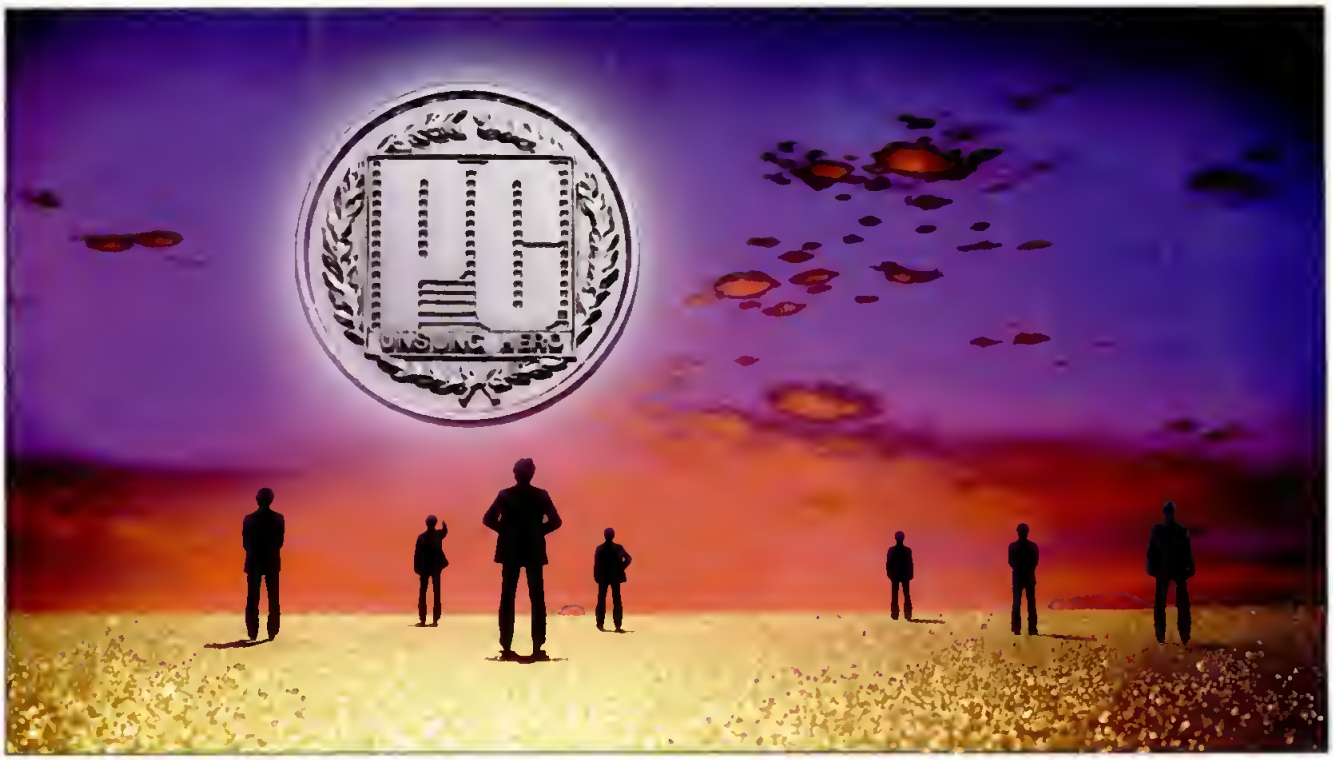

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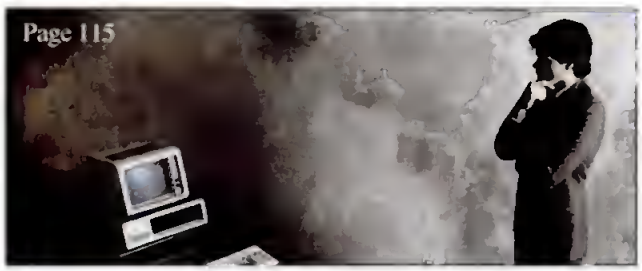

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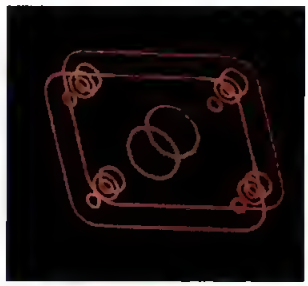

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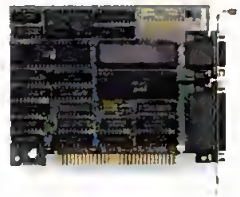

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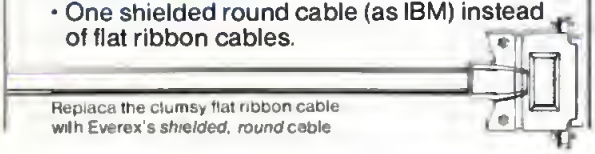

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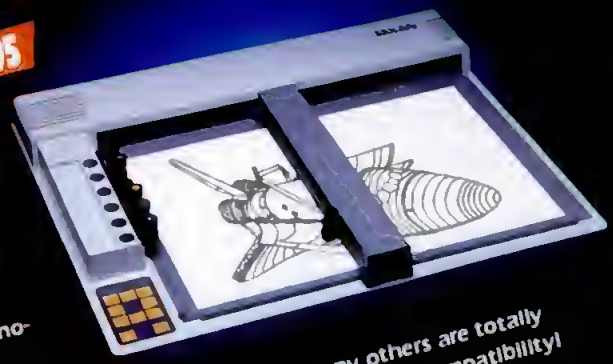

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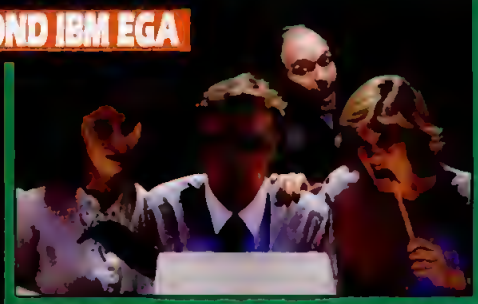

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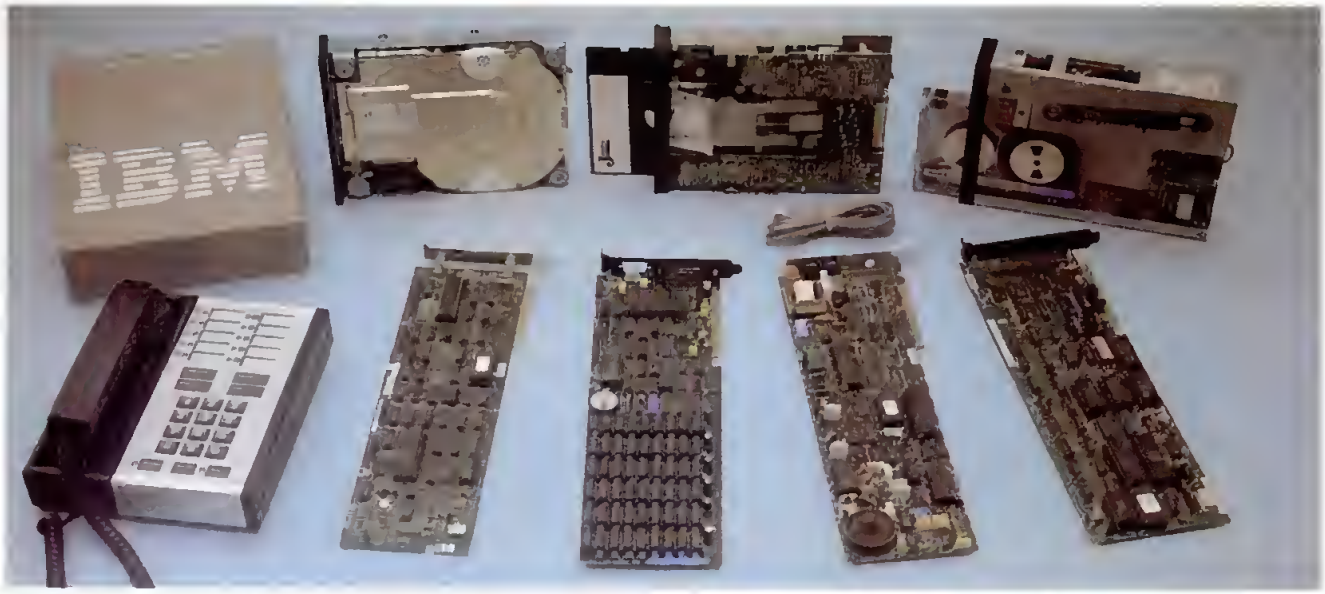

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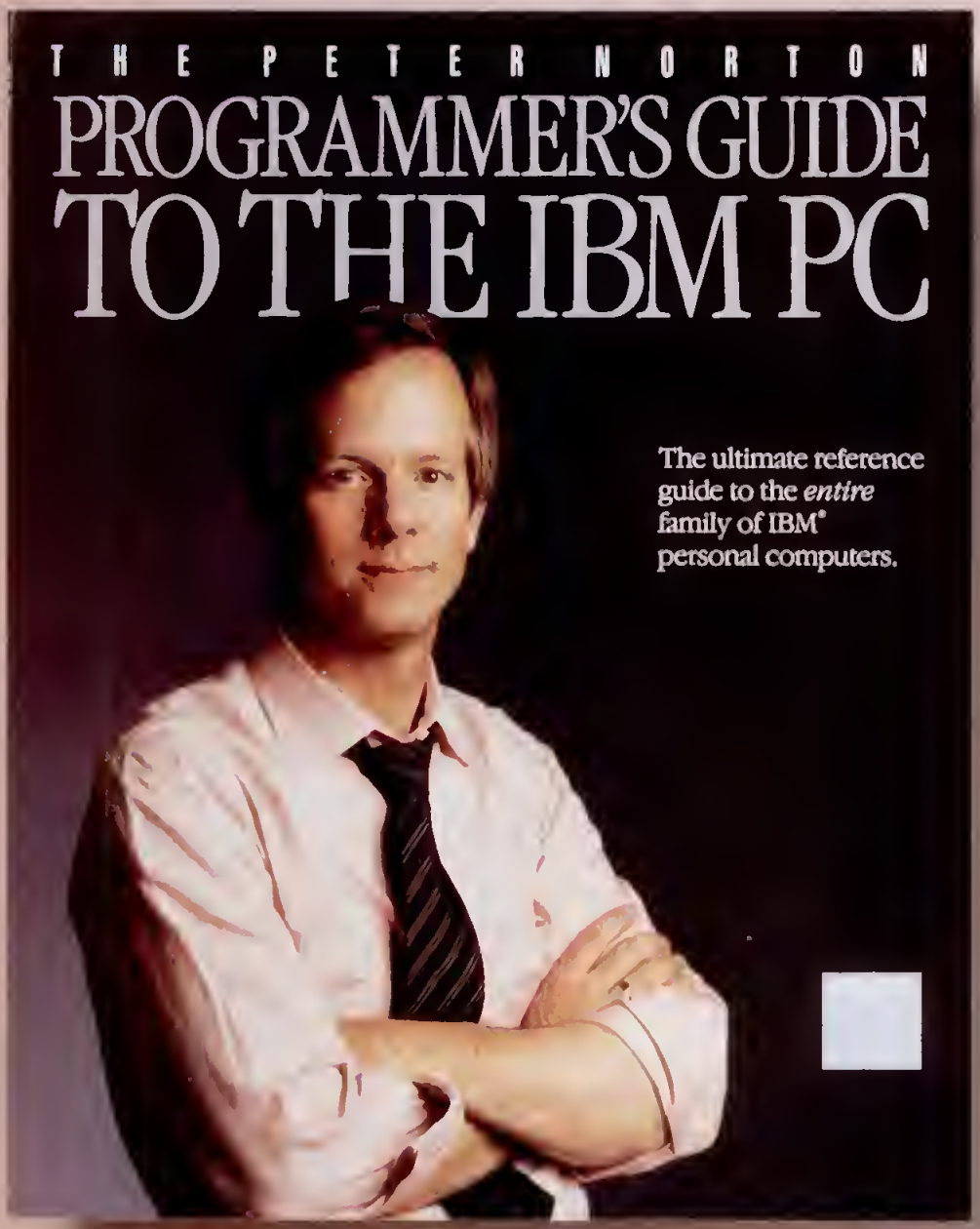

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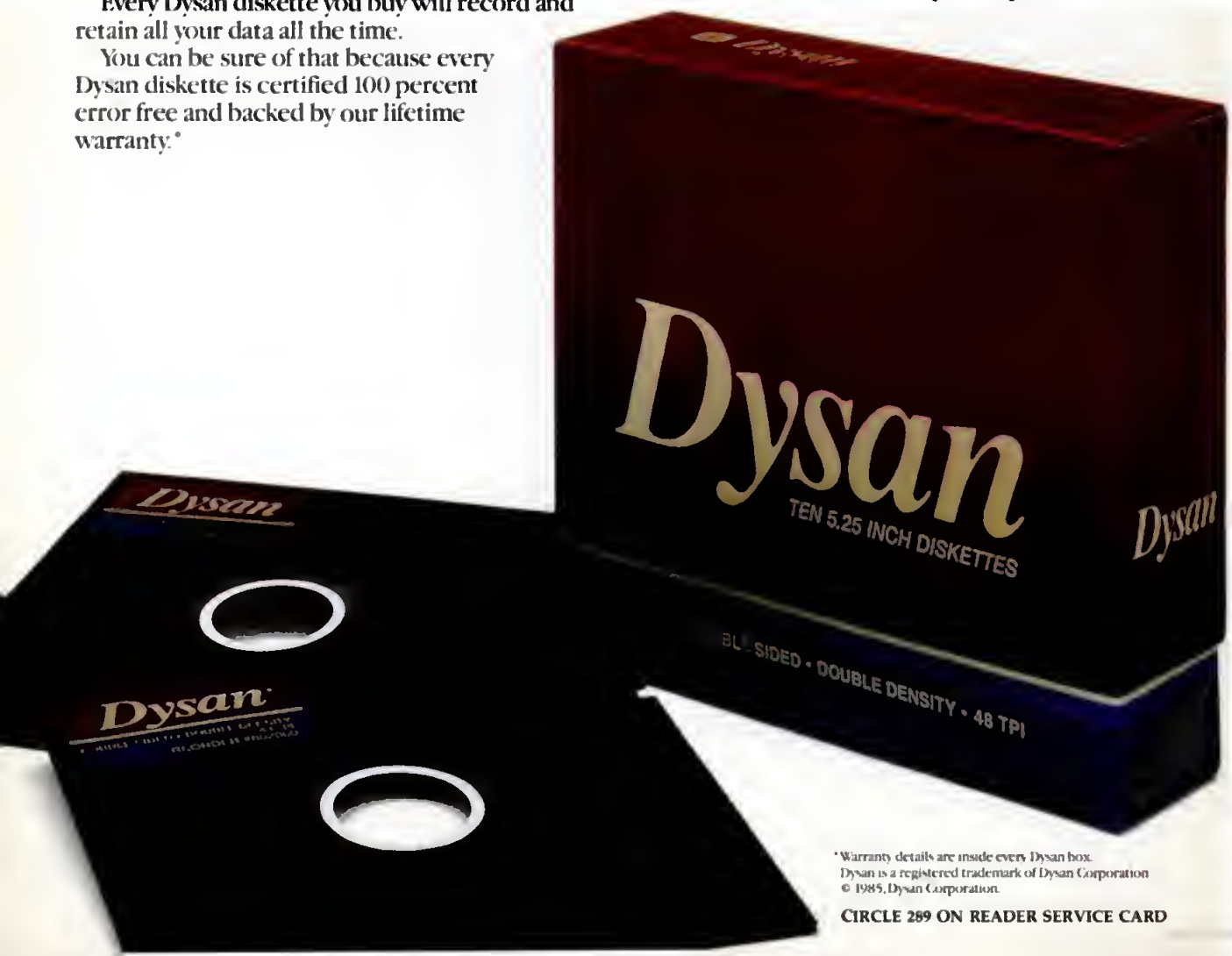

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CIRCLE 289 ON READER SERVICE CARD

The Independent Guide to IBM Personal Computers

What's Inside

A new executive editor, quirky writers, awards to unsung heroes, a special report on PC training, and persistent PR reps are the prime ingredients that went into the making of this issue of PC Magazine.

The more observant among our readers may have noticed that several designations on the PC masthead have changed. For those of you not familiar with editorial parlance, the masthead is the listing of staff members that appears on page 4. Authors live for bylines. Editors live for the masthead.

While admittedly it doesn't exactly make for thrilling reading, the masthead can be a rewarding source of information. New writers, for example, study masthead titles in order to guess who should receive their queries. Readers equipped to communicate electronically can find *PC*'s database call numbers as well as the phone number for our Interactive Reader Service. Further, you can demonstrate your good eyesight to your friends by reading the entire bottom paragraph (in tiny 3-point type) out loud at arm's length.

Those of you who scan the masthead regularly may have noticed a new name on the Executive Editors line. If you look back a few issues, you will find that Barry Owen, formerly managing editor, has hopped up to join Paul Somerson as one of the exec eds.

Owen is one of *PC*'s California immigrants. Although I am happy to report that he seems to have adjusted to New York, he retains a Californian's unnatural optimism. He now joins Somerson and editor Bill Machrone as a permanent member of the *PC* Editorial Planning Secretariat. While continuing to oversee the day-to-day production of *PC*, Owen will focus on "the middle of the book:" features and cover stories.

Of course, not all staff changes are reflected in the masthead. For example, executive editor Somerson is also enlarging his domain. To his current roles as editorial planner, chief editor for PC News and *PC*'s many columns and departments, as well as the back-of-the-book technical columns, he adds responsibility for four special—we call them "blockbuster"—issues a year. A prolific writer himself, Somerson is now going to oversee the activities of all our "writing editors." These are the staff members who review products, run projects, and otherwise supply much of the copy that eventually finds its way into the magazine. Somerson will also supervise operation of the newly enlarged Lab, formerly referred to in these pages as "The Toy Shop."

Both Owen and Somerson will now have the privilege of dealing with *PC*'s contributing editors and freelance writers, most of whom are extremely knowledgeable, efficient, talented—and occasionally somewhat quirky.

For example, every magazine, and *PC* is no exception, has writers who are sure that every word dripping from their pens is worthy of a Pulitzer Prize. These writers call editors at 5:05 p.m. (just when they are halfway out the door with a tennis racket in hand or on the way to an aerobics class) and say, "Listen, do you have a few minutes? I just got the latest issue and read the changes you made in my article, and I want some things explained. To begin with, page 1, line 3, word 6. . . ."

And then there's the nervous author who is constantly updating material weeks after its been submitted—important changes such as the name of the sister-in-law of the writer of the software. Or the writer who uses 16 paragraphs to explain how a new word processing program uses assembly language to perform one of its 100 functions and then doesn't understand why those long-winded paragraphs have to be cut from the story. Or the writer who calls at 4:45 p.m. on the day that the story is due and says, "I'm really sorry, but I just discovered that I accidentally erased my story, and I didn't have a backup. Do you mind if I'm about a week late?" Or the writer who. . . .

The Magnificent Seven

The seven men featured in this issue's cover package certainly do not need

Photograph: Shig Ikeda

someone like Owen or Somerson to spur them on to great heights of creativity. They are the industry's unsung heroes: those imaginative and intelligent individuals who have, either alone or with the help of their peers, pushed the world of microcomputing into new and unexplored territory.

Associate editor Barbara Krasnoff, who interviewed these gentlemen, is both a journalist and a native New Yorker (and, therefore, refuses to be impressed by anyone short of Albert Einstein). She was absolutely flabbergasted when she had finished the interviews. She reports that they are much more than just front-runners in their respective fields. "The thing is," she says, "they're all so damned *nice*!"

Too Complicated to Handle?

This issue also offers special reports on computer training. While more and more businesses are investing in computers for all sorts of applications, many are still running up against a sticky problem: what do you do with it once it's on your employees' desks?

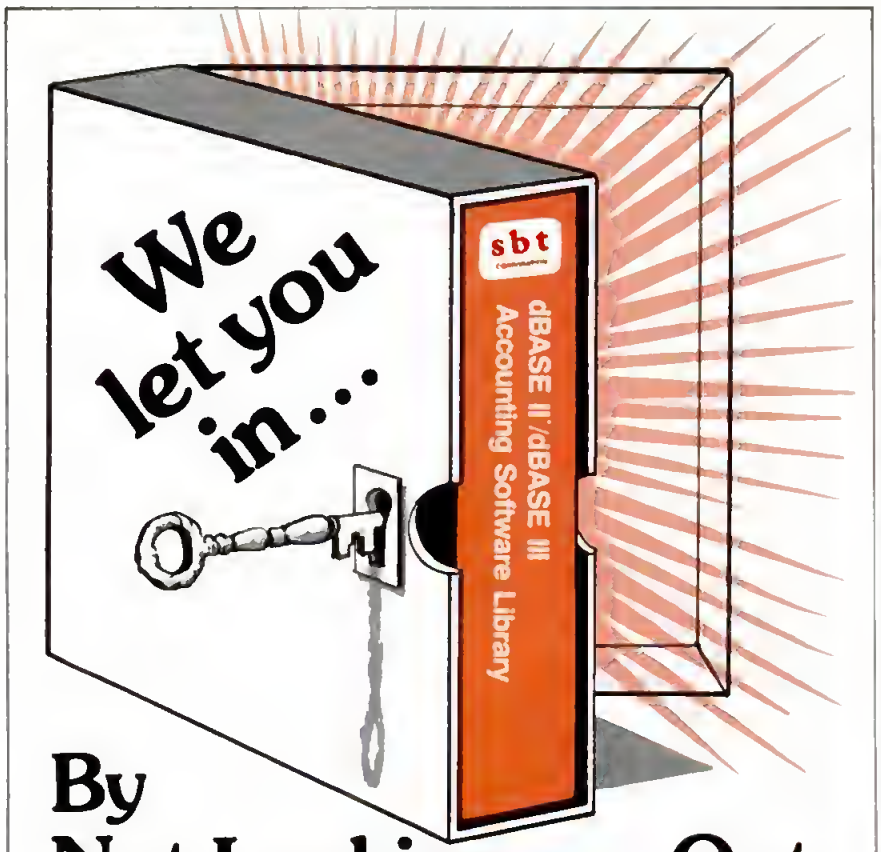
Do you simply hand them the software and hope for the best, invest in an expert to show them what to do, or send them to an equally expensive seminar? Or is it possible, and more efficient, to set up your own in-house training program?

PC assigned some of its top writers to investigate all aspects of training. They not only run down all the factors that a business should consider when deciding how to train employees, but they profile several large and small businesses that have solved (or not solved) their PC training problems. *PC Magazine* also takes one specific and very popular software product—Lotus's *1-2-3*—and reviews the full spectrum of currently available training resources.

An Unusual Complaint

Finding resources for the subject of training was no problem for the authors involved. Several of them contacted associate editor Lisa Kleinman with a very unusual complaint. "I've been getting calls from PR firms all day," one writer said. "The word's out that *PC* is doing a special report on training, and everybody wants to be in it."

Kleinman couldn't do much of anything for these unfortunates (especially since *PC* wanted to represent as many companies as possible) except suggest that they tell the manufacturers to call *PC* instead. You know where the phone number is, don't you? In the paragraph at the bottom of the masthead—the one with 3-point type. ■



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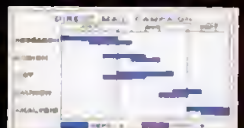

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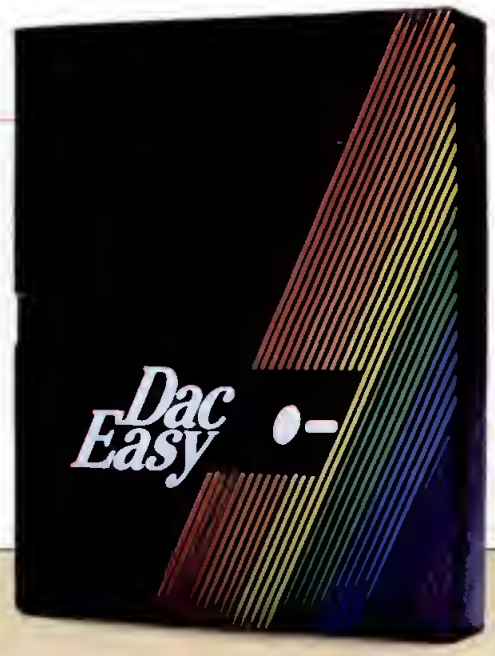

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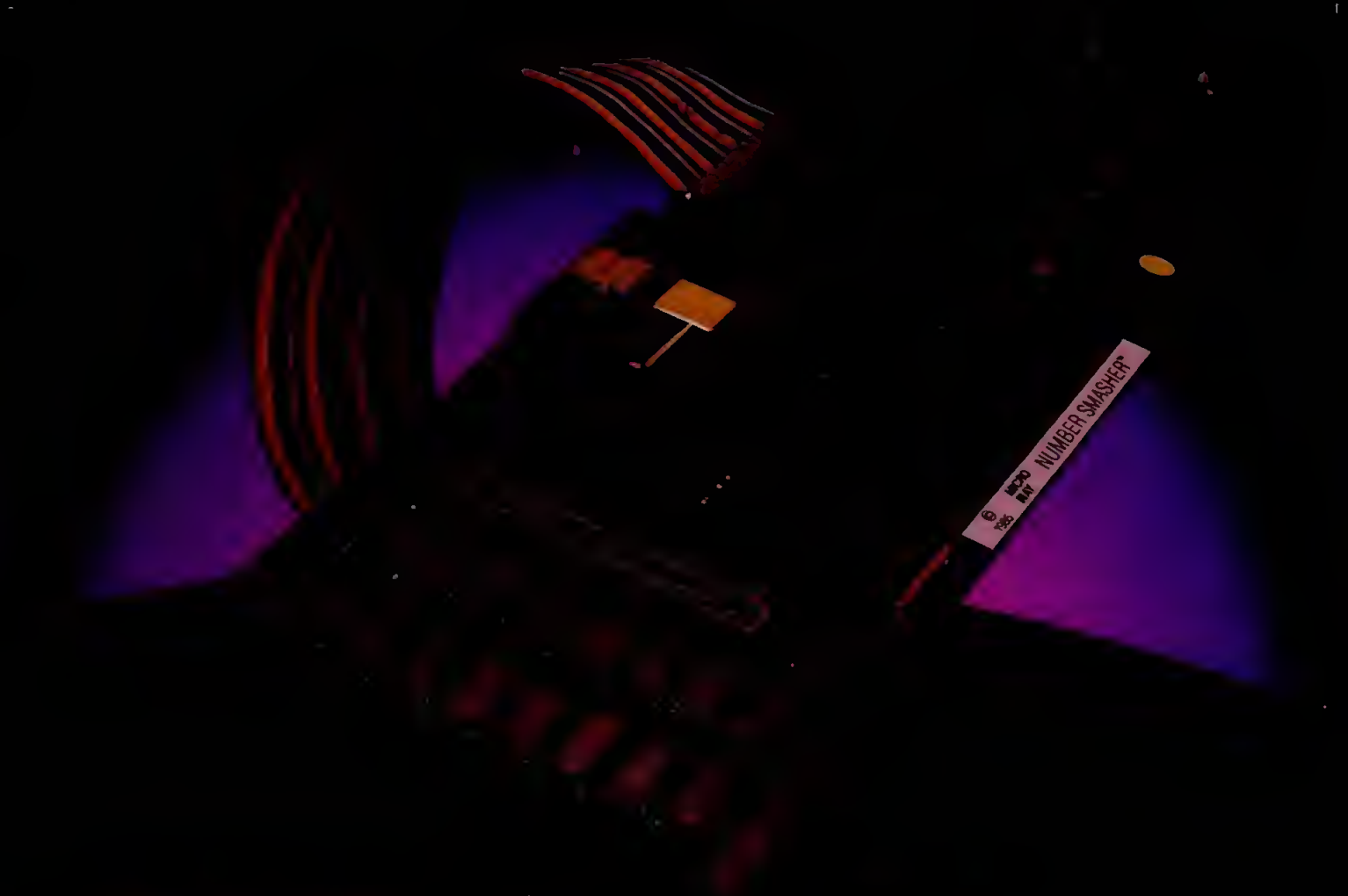

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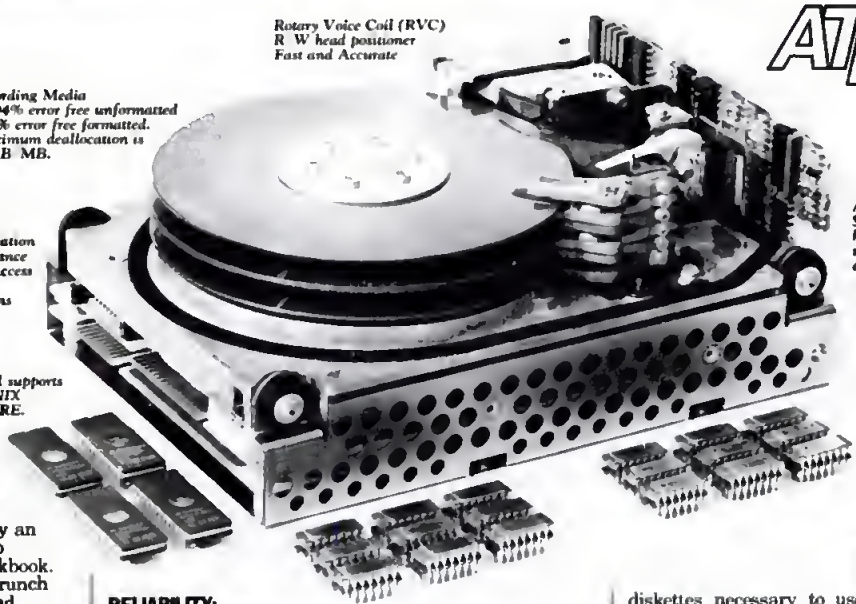

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You didn't buy an IBM PC-AT just to balance your checkbook. You bought it to crunch lots of numbers and words, in the shortest possible time. A labor saver. A time saver. Hence, a money saver.

So, do your part for effective money management; hard disk storage is no place to be penny-wise and pound foolish.

TELL 'EM YOU NEED HIGH SPEED AND DATA PROTECTION.

These and other important features do add cost, but that makes a premium drive.

Anything that can be made, can be made cheaper, sell for less, offer lower performance, and probably die young.

Remember, usually you get what you pay for, and you ALWAYS get what you don't.

ALL HARD DISKS ARE NOT CREATED EQUAL.

There are vast differences in the speed and reliability of Winchester hard disks. Since the IBM PC-AT is an incredibly fast machine, a slow drive can make an AT run like an XT.

So, before you get stuck with a slow drive in your AT, save your boss two grand and buy an XT.

Or better yet, buy the AT and avoid any drive with Access Times over 40 milliseconds.

RELIABILITY: WHERE HAS ALL THE DATA GONE?

Now tell 'em the drive must have a data protection scheme. One that's easy to use and reliable.

Winchester heads read and write while "flying" a few microns above the data surface. If the heads contact the recording media, you risk a head crash, and significant or total data loss.

So, even a fast drive without data protection is virtually worthless. Frankly, we'd rather sleep at night.

BEWARE OF USER-DEPENDENT PROTECTION SCHEMES.

Some drives have a safe landing zone for the heads, but you need to call a separate program to send 'em there. If you don't call that program, and most folks won't, the heads in these drives ALWAYS land on data when powered down.

The slightest bump or vibration can move the heads, wiping out those data tracks. And the R/W heads can become contaminated, thus increasing the error rate, slowing down average access until the whole drive fails.

Consequently, those drives offer a very high risk of head crashes, a false sense of security, and little else.

What's your data worth? $200? $400? Specify AUTOMATIC data protection. ATplus has it. And it doesn't cost, it pays.

PEACE OF MIND.

Specify AUTOMATIC park and lock of the heads on power down.

This system provides unparalleled head crash protection, by sensing power loss to the drive, and retracting the heads to a dedicated landing zone before they can land on your data.

Since this is 100% automatic, user-dependent risk is eliminated.

OUR DRIVES HAVE ALL BEEN TO BOOT CAMP.

Avoid drives that CLAIM PC-AT compatibility but can't BOOT the AT. By the time you juggle the diskettes necessary to use one of those drives, the phrase "user-hostile" will have deep personal significance.

We believe that computers ought to serve people, not the other way around.

BEWARE OF THE BARGAIN BAND-SCHLEPPER.

Avoid drives with inexpensive Band-Stepper positioner technology. These were pretty good way back in 1980, considering that's all anyone had. But by today's standards, they're inaccurate and very mechanical.

They waste time looking for the right track to read or write. And they're worth no where near the price you'll pay for 'em –in more ways than one.

THE HIGH TECH SOLUTION.

Specify state-of-the-art ROTARY VOICE COIL (RVC) head positioner and CLOSED LOOP SERVO technologies.

This system uses a DEDICATED SERVO SURFACE (DSS) for continuous head location information.

The RVC and DSS use a large scale microprocessor to translate new track-seek commands into current that is applied directly to the RVC.

This moves and holds the R/W heads at the exact track intended.

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IF YOU PROGRAM IN 'C', PC BRA

Our Craftsman™ Line Has New Products,

C-SPRITE

Lattice's Own Symbolic Debugger for Lattice® C

This versatile companion to your compiler gives you the best of both worlds for an out of this world price. Hand it a COM or EXE file produced by the Lattice compiler (using the -d option) and C-Sprite™ will speak your language: your function names, your variable names, your data types, and the line numbers from your source code. At the same time you can get a close-up view of machine addresses and machine-coded instructions, if you want to scrutinize just what machinations the compiler (or an assembler) contrived.

You already know how to converse with C-Sprite if you are familiar with Microsoft's Debug. Lattice began with that well-known command language, and added to it considerably. You can work with data in hex, as you might expect, but you can also differentiate between C's data types to cause the debugger to treat addresses as strings, long integers, etc., even pointers, both in display and entry.

C-Sprite can set breakpoints using symbols or addresses. You can submit clusters of commands to be executed at the breakpoints, or set commands that execute until a condition is met.

C-Sprite even has macros—use your source code variable names in a macro to dump the contents of entire C structures, for example. And you can debug through one of the COM ports with a second terminal so as not to disturb your program's display screen. What's more, if you link with Plink86™, C-Sprite can even tackle overlays.

Program doctors will find plenty of implements to rummage through in this kitbag.

Product Code:	List Price:	Our Price:
L2300	$175	$159

EXPORT EXPERTISE

PC BRAND ships anywhere. We'll prepare the export documents and ship to you or your agent by air parcel post, air freight or courier. Phone or Telex your order. Pay by credit card or wire funds to PC BRAND, % Chemical Bank, 126 East 86th St., New York, N.Y. 10028, Account No: 034-016068. We will ship immediately.

TEXT TOOLBOX™ #1

These Utilities Work Wonders of Organization

Welcome to "grep", "wc", "ed" and "diff", tools you will reach for as routinely as "copy" once you come to know them. Unix™ boasts a number of muscular utilities that are migrating to the PC world. Lattice has assembled a cluster of the most useful text management tools into a single package.

"Grep" looks for text patterns in any number of files. Want all occurrences of a global variable throughout a program system? Want to search all programs in a directory, down paths to other directories, or all files on a disk? Need to find all the function calls in an entire program system? Grep can do it with a powerful expression syntax that goes far beyond your text editor's search command, because you can tell it to search all "*.c" files for all lines with "(" and ")", no matter how many characters lie between the parentheses. In text searches it will match any character in whatever character range you cite, in a single character position or anywhere in a string, as you specify. Or "Grep" will match patterns only at the beginnings or endings of lines, and can differentiate between embedded and isolated strings. "Grep" is a real grabber.

"WC" counts lines, words, and characters in a file and has a checksum independent of machine character sets so you can test whether a file has successfully been transferred between computers.

"Ed" is similar to the well-known Unix editor. It offers search and replace with "Grep's" syntax, block move, read and write, optional line numbering, append, insert, delete, and this unusual facility: you can instruct "Ed" to apply a file of commands to any number of target files, even complicated changes and text additions, such as those created by "Diff".

"Diff"? You've probably tried to write one (and then discovered how tangled the logic gets). "Diff" compares text files line for line and reports differences. It's much more sophisticated than "filecom", if your MS™-DOS has that. It can optionally ignore "white space" differences (blanks, tabs). It uses complex algorithms to re-synchronize between files after disparities of any number of lines are found. And its output is a precise list of instructions telling what to do to make two files the same, a list which you can hand to "Ed" to do the job!

You'll ultimately find such assistance indispensable. Like having a librarian to sort out the confusion every day and keep your work tidy.

Product Code:	List Price:	Our Price.
L2200	$120	$105

CURSES

A Screen Management Interface to Swear By

Curses is a Lattice creation which manages the screen of the IBM PC in the same fashion as the curses utility of Unix and similar operating systems. Use it to adapt programs which call Unix's curses functions for screen management, and need the equivalent library when moved to the PC for re-compilation. Or use it when creating software on the PC to assure that it is Unix compatible.

Curses is a library of eighty-four functions and macros which can keep any number of screen images in memory. A screen may be full or partial size, and any can be summoned to the physical screen at your programs's command.

Within a screen, Curses employs a vast function set to get characters, wrap lines, scroll, blank lines, highlight—virtually any tool needed to update the screen. The product supports color, and all four memory models. Its input functions give you control over whether to echo each character to a memory screen. In keeping with the terminal orientation of Unix curses, the physical screen is repainted (at high speed) only when your program calls a refresh function.

Writing screen management code leads to unspeakable snarls and expressions. Swear off! Let Curses clean up your language.

Product Code:	List Price:	Our Price:
L0890	$125	$110

C CROSS COMPILERS

Portability to 16-Bit With Cross Compilers From Lattice

PC BRAND now carries an assortment of cross compilers to move products from larger host machines to the PC-DOS or MS-DOS environment.

Cross compilers are now available for these hosts: VAX/VMS™, VAX/UNIX, MC68000/UNIX, Altos 586, Hewlett Packard-UX.

Cash in on products already developed on your bigger machines by rapid transfer to the burgeoning world of PC owners. Or take advantage of big machine services and utilities for your development work for the PC market, and only then download the results. A quick mental calculation will convince you that productivity gains will quickly trade off costs.

Expand Your Sales to the CP/M World

They have vanished from the headlines, but there are over a million CP/M™ machines still humming across the land. Yet *Infoworld* reports that "there's no new CP/M software". If you are part of the problem, here's a money-making way to become part of the solution. Convert your MS-DOS/PC-DOS products with our CP/M-Z80 targeted cross compiler. For a few dollars, you'll double your market in a hurry.

CODE SIFTER

Find the Fast Track for Your Program

You know it runs, but how fast? If it can't win, better not enter it in today's horse race. Don't let it out of the stable until you've put it through its paces with this perfectly priced stopwatch.

Code Sifter finds the sluggish spots in your program. On its own, it will divide a COM or EXE file of any size into thirty-two equal partitions. Alternatively, you can specify the partition boundaries with addresses, or with symbols if your linker has produced a symbol map. Then tell Sifter to run your program. It samples your object file at precisely timed intervals and counts how many times it finds the instruction pointer in each partition. Job done, it reports the number and percentage of hits in each partition.

You are in for some surprises when you discover just how unbalanced the activity is likely to be, and that's why Code Sifter is so valuable. It profiles just where you can best spend time optimizing your code, or even converting to assembler subroutines.

Code Sifter has a number of monitoring options. You can tell it to include any combination of your program, DOS, and BIOS in its analysis. You can specify the sampling rate. You can tell Code Sifter the number of times to run a program, and between each run discard the less active ranges, and re-partition the hot spots, so that you zoom in ever tighter on small areas of code. Right down to the last byte! Try it on the sample program that comes with your disk.

Code Sifter. It will give you the racer's edge.

Product Code:	List Price:	Our Price:
N3100	$119	$99

CVUE

A Text Editor to Make Your Own

CVUE is a neat screen oriented text editor which does most of the things that a good editor should do, such as automatic scrolling vertically and horizontally, insertion and overtype entry modes, block delete, undelete and move, and full DOS 2.0 directory path name support in reading and writing files.

It is easy to learn with a comprehensive command menu screen which makes the documentation an ornament. It was written by the Lattice programmers who felt forgotten by the folks who write WP software. They needed easy entry of non-display characters such as control codes and escape sequences, not footnotes. Indenting and undenting of block structures loomed larger than italic printing for them. Pattern searching won out over spelling checking. So CVUE was born.

CVUE has its limitation. It only supports in-memory text files, but with memory at today's prices, creating and maintaining files 500 KBytes long is practical. Anyway, modular source code of structured programs never gets nearly that big. As compensation, CVUE is very compact and fast. Even in 64K computers it has no need for tediously slow overlays to perform its full function repertoire.

The power of CVUE is its ease of customization. Even the binary version offers full customization of the keyboard editing commands. And when you take advantage of the Source Code option on the next page, the resultant editor can be made truly your own.

Product Code:	List Price:	Our Price:
L2240	$100	$90

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dBC

Switch from dBASE's Language to C for Power, Speed

There are a lot of dBASE™ file users out there. Most of them just keep data bases and use dBASE's limited reporting facilities. They're not programmers, so they don't use the dBASE programming language. But they'd like more for their efforts, and that's a business opportunity.

dBC™ links C to dBASE. It is a function library that creates files which exactly replicate dBASE file design. So dBASE can read and update them. And the reverse. dBC can use any files created by dBASE. Now C and dBASE can operate on the same data bases interchangeably.

That opens up the widespread culture of dBASE installations to exploitation by C programmers. Now you can replace the resident dBASE language with the speed of C. And you no longer have to write every line of code, because moving to C unlocks C's vast storehouse of off-the-shelf libraries and utilities.

Use dBC for custom work for customers, or design generalized programs for manipulation and reporting of dBASE data bases. Or use it on its own. It's a complete ISAM file manager for use with the Lattice C compiler whether or not dBASE will ever be used in tandem, has versions for all four memory models, and can have sixteen index and data files open at once. dBC is a complete set of ISAM routines (that parallel dBASE commands) which the manual and demonstration source files on the disk explain in detail.

Two Versions:	Product Code:	List Price:	Our Price:
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C-TREE

B-Tree File Manager, Source Code, No Royalties! NEW!

A b-tree can be infested with bugs, so before buying one, ask its age. In a stand of saplings, this one is a real cequoia. C-tree™ has been around since 1979. That means seasoned, sturdy code which hasn't cracked under the weight of prolonged and widespread use.

Its developer has added two very unusual features. C-tree now comes in C source code, revealing all you've ever wanted to know about how b-trees are written. Second, provided you bind it into your binary application, you can redistribute C-tree without royalties.

Thanks to source code which does not deviate from the K&R standard, C-tree can travel. Binary has always meant finding a substitute file manager when you port your work to another compiler, operating system, or computer; then changing all the function calls and testing anew. That's over. Tests in many environments prove that C-tree gives your application a ticket to anywhere.

C-tree permits any number of keys for a data file, supports duplicate keys, alphanumeric or numeric, etc., etc.: it's a big product with everything you'd expect. Beyond that it is intelligently designed as both a high level set of ISAM routines to minimize your coding by handling all details of adding a record on its own, for example; and as low level operations which you can access directly. Either way C-tree maintains optimal index structures which will find a record amongst a million ten byte keys in no more than five disk seeks.

And if all this is disappointing, now the good part. C-tree's design splits nodes to allow any number of users to access an index file simultaneously even when updates are in progress so that multi-user configurations and adaptation to networks are possible. You must write the record-locking routines, as they are compiler and operating system dependent, but the documentation shows how by example.

Product Code:	List Price:	Our Price:
F0660	$395	$345

LMK

A Unix-like "Make" Makes Light of System Building in Any Language

If you have ever built a complex system, you know the time loss and tedium of recompiling, rebuilding libraries and relinking modules because a snippet or two of code has changed. Batch files are no answer. You need batches of them to avoid redoing everything indiscriminately.

Instead, imagine making a change deep in a system, and simply telling Lattice's LMK™ to take over. No further thinking or keystrokes. LMK will rebuild your final product, however involved and complex, by doing just what is needed and no more.

How? You write a command file which expresses, bottom to top, all the elements comprising your system and all its dependencies: what gets compiled to make what object file using what options; what is built into libraries; what is to be linked into the final EXE file. Through the life of your system LMK keeps track of the last time every action was performed. Run LMK and, tracking each branch, it looks only for elements which changed later than a dependent element further along the branch, using date and time information in the file directory. Any source file newer than its object file, for example. Only those elements and their dependents are re-made. All other instructions are bypassed.

The command file uses a simple, readable syntax—"prog.obj: prog.c $(HDRVS)", for example, says what source file this object file depends on, and says to fill your previously-defined macro HDRVS into the expression, which in this case might be a list of files with hardware drivers, or in another case your preferred string of compiler options.

LMK does not care what programming language you use; it's not just for C. For that matter, LMK can apply to more than programming. It can be used for *any* set of tasks which can be accomplished through commands issued to the operating system, Try it for repeated reassembly of lengthy documentation, or for *selective* reconsolidation of spreadsheets so that only the dependents of altered supporting schedules get re-calculated.

Wherever your imagination leads you, LMK will find the shortest path to get the job done. Minimum time, minimum effort software.

Product Code:	List Price:	Our Price:
L3100	$195	$175

USED COMPILERS WELCOME

Trade In for the Latest Model Lattice C

Has your compiler run out of gas? Has your model been discontinued? Is it falling behind for lack of new parts?

Even if yours is in good shape, you have surely noticed there are more options and accessories produced to run with the Lattice C compiler than any other. Don't do without these additives any longer. It's time for new license plates. Trade in your original disks and manual of any of the compilers below and we'll send you Lattice's most up-to-date model, the full bore 2.15 (at press time).

From then on you will be adopted by Lattice for full, direct support by their technical specialists.

	Price:
Microsoft MS-DOS/PC-DOS C	$150
Computer Innovations C86, Wizard C, Manx Aztec C86, Mark Williams C, Digital Research C, Whitesmith's C	$200

PRE-C

Thorough "Lint"-like Analysis Now on the PC NEW!

Unix users have long asked if we had a "lint" to give programs a thorough cleaning before they disappear into a compiler. The answer now is "yes".

Pre-C™ finds problems your compiler won't. Problems that a debugger will have trouble figuring out. Even problems which will cause trouble with other compilers.

Pre-C finds all the syntactical tripwires that will blow out a compile, sure, but it goes after subtler problems: code which will never be accessed, casts with suspect conversions, variables declared as external but never used, functions never called, obsolete usage (even the C language has changed), machine-dependent expressions which will inhibit portability.

Compilers work with one module at a time. They know nothing of other modules which only meet up at link time. Pre-C can look at *all segments of your program at once* and report to you any inconsistencies of inter-module references: conflicting data type declarations, parameter lists in function calls which disagree with the functions themselves in number or data type, declarations of external functions which differ from their definition.

Pre-C uses the Unix System III compiler standard to safeguard maximum portability anywhere in the C world. There are then plentiful command line options to advise Pre-C what to flag and what to forgive, useful during early coding when some functions are empty or incomplete. The resulting analysis can be filed for use with subsequent Pre-C runs, so work is not performed redundantly.

Pre-C lets you develop standing profiles of binary libraries you have purchased. In any C program you subsequently write, Pre-C can use these profiles to make sure your calls to those libraries' functions are perfect.

This is a big product which will work miracles in speeding large system development.

Product Code:	List Price:	Our Price.
P0690	$395	$329

Normally fits in 128K but requires 192K to analyze large programs. Requires disk space about 20% the size of all files to be analyzed.

SUPPORT DIRECT FROM LATTICE

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Lattice C Compiler Library for MS-DOS/PC-DOS	L9100	$500	$450
for Z80	L910Z	500	450
C-Food Smorgasbord Library	L9200	500	450
Curses Library	L9650	125	110
dBC Library for dBase II	L90II	250	225
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CVUE Screen Editor	L9240	350	315
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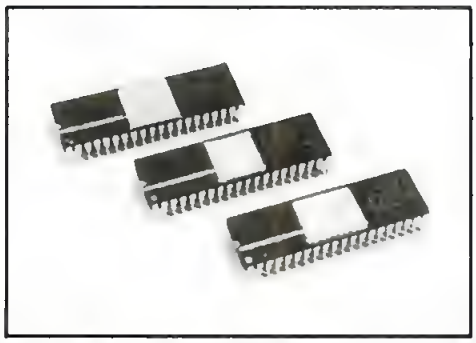

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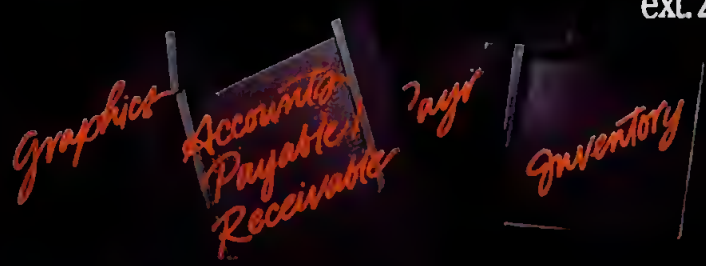

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PC MAG

CIRCLE 119 ON READER SERVICE CARD

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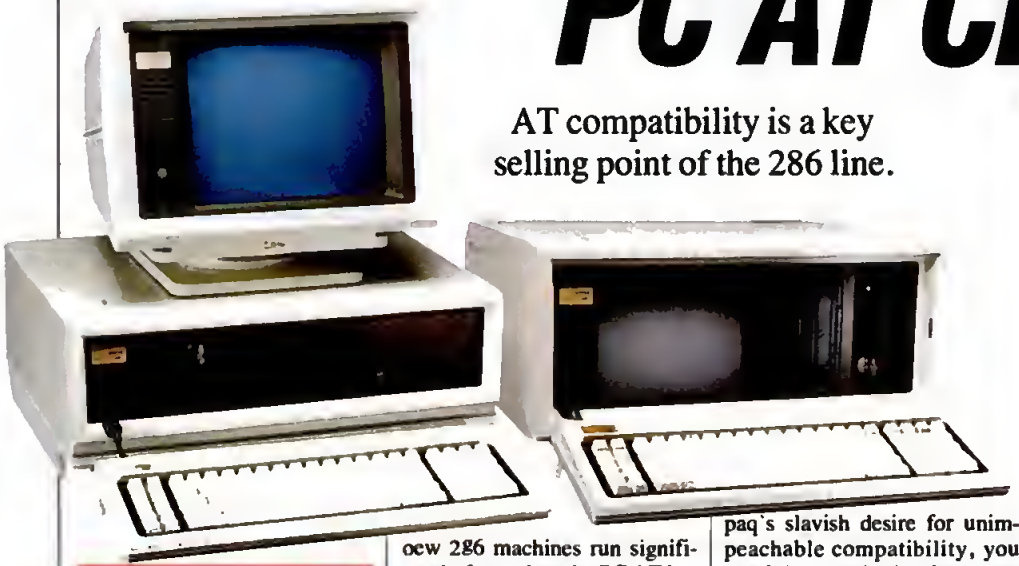
Compaq's 286: A Fast PC AT Clone



AT compatibility is a key selling point of the 286 line.

FIRST LOOK

BY BILL MACHRONE

The Compaq 286 is more than a PC AT clone. It's faster.

It's better, too. You can buy it right off the shelf with up to 70 megabytes and Compaq's proven tape backup system.

I tested two versions, the Portable 286 and the Deskpro 286. Both come with 512K on the motherboard, both are available with tape backup, and both have the AT-compatible 1.2-MB floppy drive. They share Compaq's famous dual-mode green screen and faithfully follow the PC AT's dictates by including a security lock.

The original Deskpro sported an 8086 and ran just a tick slower than a PC AT. It also had a compatibility switch that ran the machine at standard PC speeds in case you had some brain-damaged software that malfunctioned at the higher rate. The new 286 machines run significantly faster than the PC AT because they are clocked at 8 MHz instead of 6 MHz. Given Compaq's slavish desire for unimpeachable compatibility, you won't be surprised to learn that the new 286s include a 6-MHz mode as well.

One place where the desire for compatibility helps enormously is the keyboard. The original Deskpro retained the old PC layout. The 286 machines, however, use the AT's more typewriter-like layout and follow IBM's scheme right down to the misplaced Escape key. The keyboards feel like the Deskpro's: superior to the original Compaq Portable but still not up to IBM's definitive over-center click. You can still change the key-click volume and flip from monochrome emulation to medium-resolution color emulation with Alt-key combinations from the keyboard. You can also change be-

(continued on next page)

VisiCalc Production Ends

BY JAMES LANGDELL

CAMBRIDGE, Mass.—*VisiCalc*, the granddaddy of spreadsheets, is dead at the age of six.

Lotus Development Corp. says it will no longer produce the pioneer spreadsheet *VisiCalc*, one of the assets acquired in Lotus's takeover of Software Arts earlier this year.

"We feel *1-2-3* and *Symphony* are much better products, so *VisiCalc* is no longer necessary," says a Lotus spokesperson. Lotus says it will provide users of the spreadsheet with support for the next 2 years. During that time, replacement copies of the copy-protected program will remain available. Customers with IBM-compatible versions of *VisiCalc* can trade in that program for a copy of Lotus's *1-2-3*. Upgrade kits can be purchased for $250 from dealers only from August 1 through October 31. Lotus is making no upgrade offer to *VisiCalc* users with non-IBM versions.

Only authorized Lotus dealers can exchange *VisiCalc* packages for credit toward Lotus products.

VisiCalc was created in 1979 by Dan Bricklin and Robert Frankston, founders of Software Arts. VisiCorp marketed the program under an exclusive agreement until 1984, when lawsuits between the two companies were resolved and Software Arts began selling *VisiCalc* under its own name.

About 1 million copies of the spreadsheet were sold during its product lifetime, including 300,000 IBM-compatible versions, according to informal estimates supplied by Lotus.

In addition, Lotus announced its plans for some other programs acquired from Software Arts. *Spotlight* will be offered as a Lotus package, but the company is trying to arrange for another company to manufacture and market *TK!Solver*. Lotus said it also acquired rights to unnamed software that Software Arts had been developing at the time of the takeover. ■

Compaq's 286

(continued from preceding page)

tween 6- and 8-MHz operation.

The Portable 286 has the 10-MB Rodime drive found in the Compaq Plus, while the Deskpro 286 comes equipped with a 20-MB drive. The Rodime, with its inherent ruggedness and Compaq's shock mounting, can stand up to the worst that users can dish out to the Portable. The 20-MB drive has a new twist for MS-DOS computers, a shipping lock. The machine arrives with the power connector detached, so you can't use the hard drive until you've removed a pin and moved a lever. Then you plug in the power connector and you're ready to go.

The new Deskpro's 20-MB drive is made by CDC's MPI division, and it is faster than the Portable's smaller drive, which is more in line with that of the PC-XT. It turns out that the Deskpro 286's drive is actually a bit faster than the PC AT's (see "Speed of the Read").

The new 286 machines perform pretty much as you would expect: like a Compaq, only faster. In our BASIC benchmarks both machines were faster than PC ATs running at equivalent speeds. Compaq is one of the few compatible manufacturers to have gotten the source code to BASICA and improved it, so most programs run a bit faster.

The type of fan and its location on the 286 Portable are different from its Compaq Plus predecessor. It is much quieter—a welcome improvement. The machine weighs marginally more than the previous model, but once your shoulder is dislocated, what's another pound or two? ■

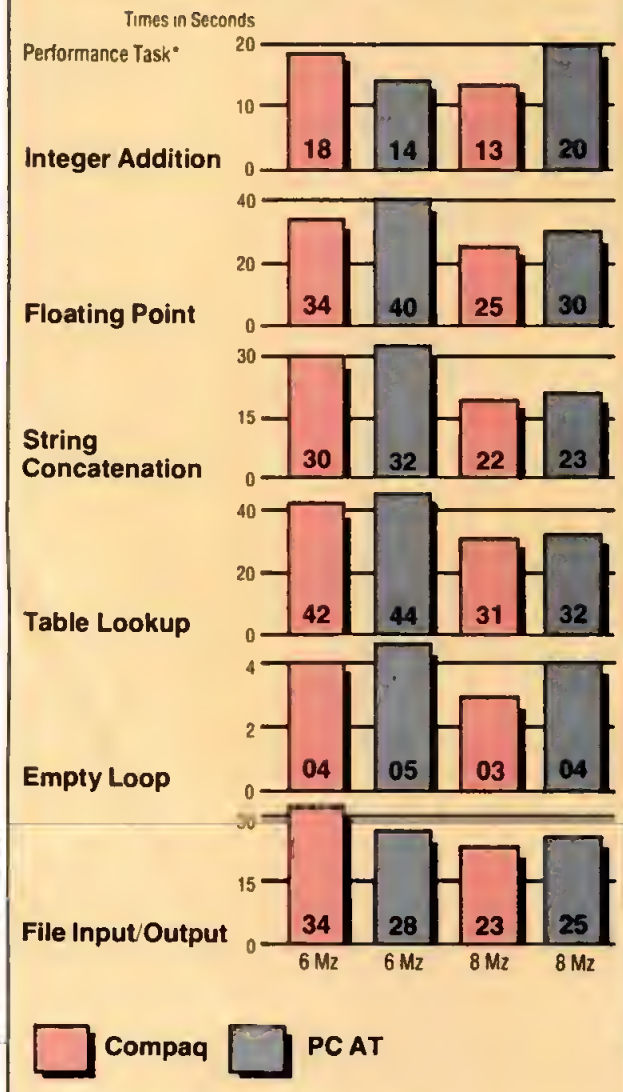
SPEED OF THE READ

CORE Disk Access Test*

Compaq Portable 286	68 milliseconds
Compaq Deskpro 286	36 milliseconds
IBM PC AT	39 milliseconds

*Measures average random disk-access speeds.

COMPAQ-AT TIME TRIALS



*Tasks performed with programs written in BASIC.

Software Sellers Line up Their Sites

New licensing policies are proliferating in an effort to get a bead on a solution to software protection problems.

BY CHARLES BERMANT

NEW YORK—The squeeze is on. Software developers have launched a war on unauthorized duplication of their programs; yet too often their victories have been Pyrrhic. Software remains protected, but at the high cost of customer dissatisfaction with program quirks and limitations.

A synthesis is emerging from this conflict of suppliers' needs and customers' demands: site licensing. As a solution to the problems of software protection, it looms as the next trend in the marketing of products for personal computers.

All site licensing has one theory in common: A vendor authorizes the duplication of a program for use in a defined physical area of one company or institution. Beyond that, there are as many approaches to site licensing as there are companies offering the arrangements. The site license authorization can be as narrow as granting permission for a program to be shared on a local area network or as wide ranging as an all-you-can-eat buffet, giving a customer as many copies of a program as he wants for one price.

Sorcim/IUS of San Jose, Calif. is the latest to unveil a site licensing program. Sorcim is marketing its productivity, business, and accounting packages at a 40 to 70 percent discount. Each diskette can be copied in quantity according to the site licensing contract. Manuals are also supplied in quantity.

The Sorcim program began in mid-June. Paperback Software, the Berkeley-based company headed by Adam Osborne; Satellite Software International of Orem, Utah; Living Videotext of Mountain View, Calif.; and MultiMate International of Hartford, Conn. are among those who have announced their own versions of site licensing agreements. Summa Technologies of Beaverton, Ore. took the lead early and has site licensed four programs for some months now, signing up some major universities, the Los Angeles County government, and a

division of Shell Oil.

"I don't try to win my competitors over to the concept of site licensing," says Summa president and CEO Ken Scott. "I'd like all other publishers to maintain their single-use licenses, adopt the ADAPSO standard, sue individual clients, and continue retail sales. Then I'll clean their clocks."

Fitting dealers into the site licensing equation has been a major stumbling block. Sorcim's vice president of marketing, Michael Crosno, says that his company's program is the first to benefit both dealers and corporations. Under the Sorcim plan, licensed dealers receive a commission whether or not they're involved in the sale.

"After a sale a certified dealer can get a check for 10 or 12 percent for doing nothing, as a gift," says Crosno.

Summa, on the other hand, is seeking to bypass dealer channels completely.

"Site licensing puts dealers back where they should be, in the position of dealing with hardware where there are better margins," says Scott. "Retail serves a good purpose, that of a low-volume customer who has prior knowledge of what he wants. If distributors and retailers turn against me, then I'll deal with customers directly.

"A dealer can turn against a software publisher. Vendors don't now know how to work the dealer in; if they were to start over, they'd do it this way."

"Site licensing puts dealers back where they should be, in the position of dealing with hardware where there are better margins."

Take My Program, Please

The Summa agreement licenses each site or division of a corporation, permitting any current or future employee to use the program legally. Under the agreement, employees can also use the software at home without threat of litigation. Scott says the program eliminates the controversy generated by software use on local area networks, adding that programs that don't have to recoup the costs of merchandising will ultimately cost less.

Dealers Beware

Limited shelf space, along with dealer unwillingness to stock untried products, has made it difficult for small software vendors to sell their wares. Summa has been unsuccessful in building a successful dealer network, which makes the company resentful of both retail profit margins and what they perceive as a closed-minded attitude.

Dealers, not surprisingly, have reacted more positively to the Sorcim proposal, which does not cut them out completely.

"This reflects a greed typically exercised by smaller companies who are going to lose a share of the dealers anyway," says John Williams of the Software Specialists in Washington. "I lose confidence and enthusiasm for any company that shows a tendency to screw the dealer."

Williams, who called the Sorcim program "realistic," says, "The companies that bypass dealers may make some short-term gains, but it will hurt them in the long term. Site licensing requires no extra support and knowledge on the part of the company above and beyond that for the standard packages."

Neither Summa nor Soreim employ copy-protection measures for their software packages. Sorcim's Crosno concedes that the code that restricts program duplication can be easily broken, "but by the same people who'd buy one copy of a program and copy it innumerable times. We're not trying to control piracy; we'll just keep the good guys honest."

A Summa representative says that "a lot of competitors are obviously annoyed" that the program has gained steam, adding that some so-called site licensing agreements are only "thinly disguised volume discounts." The company plans to develop and acquire products, including desk organizers, to offer a full catalogue on a site licensing basis.

"Software publishers are confronted with a crapshoot when putting out a new product," says Scott. "They have to make a multimillion-dollar investment over the space of 90 days and hope it will be recovered. It results in an unacceptable financial circumstance for the publisher; the risk/reward ratio has an inadequate outcome. Many customers would be better off dealing directly with the publisher."

A prospective site licensee can acquire a sample Summa program for $100. Scott requested that those interested in the company contact it directly at the following address: P.O. Box 2046 Beaverton, OR 97075, (503) 644-3212. Soreim/IUS can be contacted at 2310 Lundy Ave. San Jose, CA 95131, (408) 942-1727. ■

H-P Hits Market With New Portable PLUS

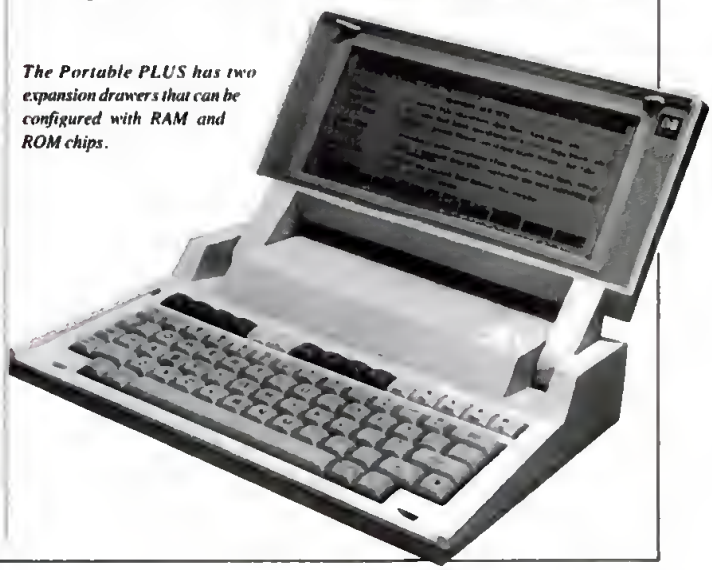
NEW YORK—In a bid for the burgeoning lap-top market, Hewlett-Packard has enhanced its original portable computer. The company says the machine, called the Portable PLUS, is designed for use by managers and sales professionals who spend a lot of time traveling.

The Portable PLUS features an adjustable 25-line-by-80-character LCD display that can interface with full-size video monitors. Weighing in at less than 10 pounds, the machine has a 13- by 10-inch footprint. It includes two expansion drawers that can be configured with ROM and RAM chips, with a total capacity of 3 megabytes of memory. An optional disk drive unit is also available.

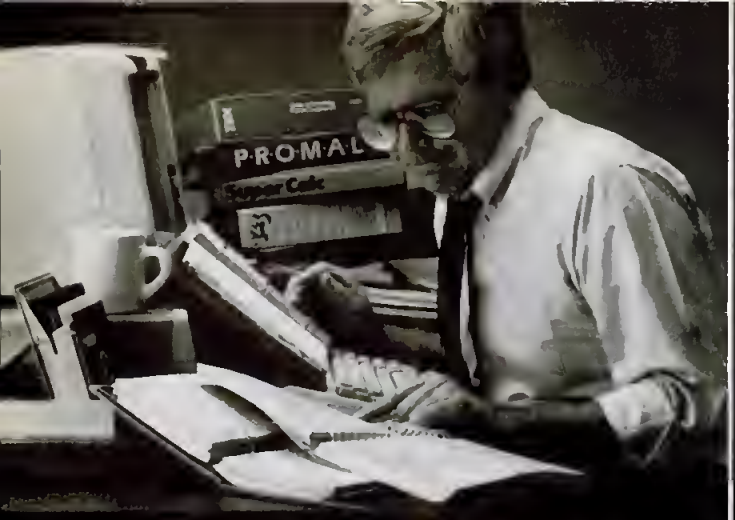
Hewlett-Packard says the ROM and RAM circuits can store and retrieve data 10 times faster than a disk drive. Furthermore, the nonmechanical "E-disc" can better withstand shock and adverse environmental conditions, and a variety of software will be made available in this format.

The PLUS will retain data for 6 months while turned off. Battery power comes from permanent lead/acid-gel cell batteries, which must be recharged after 20 hours of continuous use.

The Portable PLUS lists at $2,295. *—By Charles Bermant*



The Portable PLUS has two expansion drawers that can be configured with RAM and ROM chips.



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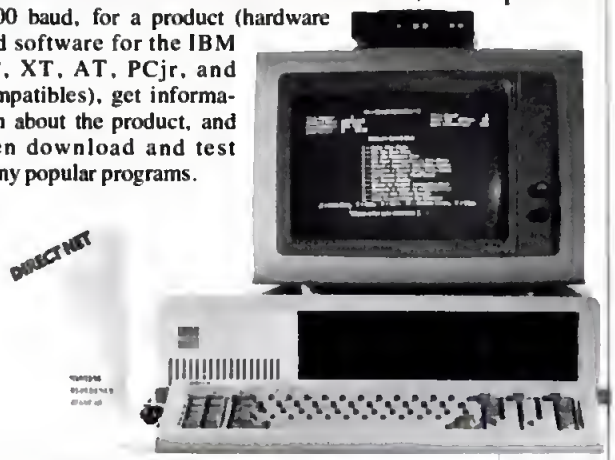
NEWS IN BRIEF BY JANE MINTZER

Home Demonstration . . .

The never-ending search for the right software or hardware may be a lot simpler thanks to **Direct-Net**—an on-line product database devoted to PC hardware and software. Direct-Net users can search the database, which operates at 2400 baud, for a product (hardware and software for the IBM PC, XT, AT, PCjr, and compatibles), get information about the product, and then download and test many popular programs.



Direct-Net allows users to download and test software prior to purchase.

Craig Isaacs, marketing director of Direct-Net, says the service will be marketed to large companies and computer consultants but will be useful to anyone who uses many different software programs. There are over 100 software packages that can be demonstrated through Direct-Net, including *WordStar 2000*, *1-2-3*, *PC-Draw*, *PFS:Write* and *PFS:Plan*, *Enable*, *SPSS/PC* and *CROSSTALK XVI*.

A subscription to Direct-Net costs $50 a year, and connect time is charged at $10 an hour. The subscription includes DNCOMM, the service's communications software. For further information, contact Direct-Net, 31220 La Baya Dr., #110, Westlake Village, CA 91362, (800) 223-0822 or (800) 824-5526 in California.

One Hundred Nineteen and Counting . . .

Officials at **MicroPro International** say that printer support builds word processing sales, and as the makers of *WordStar* and *WordStar 2000* they are certainly in a position to know. Users of *2000* will be pleased to learn that the much-discussed word processing program will now support at least 119 printers, including the Hewlett-Packard LaserJet. MicroPro is also broadening the printer support of *WordStar* Version 3.3.

Free printer support enhancement disks will be mailed automatically to registered users of *WordStar 2000* and *WordStar 2000 Plus*. Registered users of *WordStar* Version 3.3 can get the printer support enhancements from their dealer or from MicroPro.

MicroPro's headquarters are at 33 San Pablo Ave., San Rafael, CA 94903, (415) 499-1200.

Reviving the Bundle . . .

Adam Osborne, the president of **Paperback Software International** (PSI), continues to gain attention for his company's line of deliberately low-priced software. He recently announced that his company's software will now be bundled with **Computer Frontier Ltd.**'s two IBM PC-compatible computers—the Tava PC desktop computer and the lap-top Tava Triumph LT Personal Computer.

Both computers will include copies of PSI's word processor, *Executive Writer*; a file management program that integrates with the word processor, *Executive Filer*; a spreadsheet program, *Number Works*; and a graphing and drawing program called *Draw-It*.

The Tava PC with 256K RAM, two disk drives, and the bundled software costs $1,495. The Tava Triumph LT, which is set up with the same configuration, is priced at $2,695.

PSI is located at 2612 Eighth St., Berkeley, CA 94710, (415) 644-2116.

Possible Patent Infringement . . .

IBM, its **Rolm** subsidiary, and **Wang** are all being charged with patent infringement by Rob Elkins of **Elk Industries, Inc.** Elkins, who describes himself as the "father of digital-sound reproduction," claims that all three companies are using the audio storage and distribution technology he invented 15 years ago, later patented, and unsuccessfully tried to market to IBM.

Elkins claims that he invented a system that converts analog signals to digital representations that are either stored and/or distributed over a variety of communication devices. These digital representations are reconverted to analog signals to be used and subsequently controlled through a touchtone telephone. Elkins claims that IBM's Phone Mail system is an infringement of his patent. The suit, which was filed in Miami, Florida, is still pending.

Private Labels . . .

Adding to its line of private-label letter-quality printers, diskettes, and supplies, **Businessland Inc.** has introduced a private-label internal and external modem.

The BL1200 internal modem operates at 300 and 1200 baud and features automatic dialing, automatic answer, and automatic speed selection. It comes with Microstuf, Inc.'s *CROSSTALK* communications software and costs $499.

At $529, the BL1200 external modem has all the same features as the internal modem, but it does not come with software.

Businessland headquarters are at 3600 Stevens Creek Blvd., San Jose, CA 95117, (408) 554-9300.

Port or Star Board . . .

A new flexible adapter board with multiple serial communication ports has been introduced by **Star Gate Technologies**. The OC Series lets users add four to eight RS-232C/RS-422A serial ports to the IBM PC or AT.

The OC adapter boards allow PCs to tie into modem lines and communicate with mainframes and peripherals such as printers or plotters. They were designed to be used with multiuser operating systems such as XENIX, but the cards can be used with PC-DOS. Two highlighted features of the OC Series are an address decoder and interrupted circuitry. The OC8500 interrupt device costs $25.

Star Gate's OC Series gives users multiple serial ports.

A simplified cabling system is available for hooking up printers and other serial devices by using the OC8000 RS-232C Remote Panel and a single, 25-conductor ribbon cable.

The OC8000 (8-channel module), the Remote Panel, and the cabling costs $470; the OC6000 (6-channel module) is $420, and the OC4000 (4-channel module) is $370. More information can be obtained from Star Gate Technologies, P.O. Box 764, Cleveland, OH 44026, (216) 831-5922. ■

Videotex Service Goes Expressly For Software

BY JAMES LANGDELL

FAIRFAX, Va.—Last year more than a half-dozen companies offered systems for distributing software electronically to customers or stores. Since then few commercial programs have actually been sold and delivered over the phone lines. Already many electronic distributors, such as Xante and Romox, have thrown in the towel. Other companies, such as Gimcrax, Inc. are trying other strategies besides competing head on with traditional distributors (see "Gimcrax Sales Fall Off-Line").

But one company, Software Express Videotex (SEV), now has a system up and running that's delivering software for the IBM PC over the phone. Is this the end of the line for software boxes?

Unlike previous attempts at electronic software distribution, SEV sells software of its own creation rather than trying to market programs already sold through retail channels.

Other on-line distributors failed, says SEV president Eric Gagnon, because "they were trying to sell the same $300–$500 software programs in a way that had no benefit for the consumer. I can't see anyone getting excited about buying software by making a $300 phone call."

SEV's collection of original software is called the Master Selection—63 programs at prices from $3.95 to $27.95. All the programs are standardized to offer instructions and commands through a window format. The selection includes financial analysis packages, games, and utilities. One program is a shell for DOS that presents commands in window menus. SEV does not charge any additional connect-time fees for the time used to download this software.

In addition, 175 public domain programs for IBM PCs are offered in the service's Software Channel library. Subseribers are charged only connect-time rates for downloading these programs, which are not equipped with the window format used in Master Selection programs.

A third collection of programs will be the National Software Exchange. Subscribers are invited to contribute their original programs and receive royalties when their software is downloaded by other subseribers. "User publishing was always a popular feature on The Source," says Gagnon.

All the available programs are described in a periodical catalog called *Download*. It lists the number of minutes it takes to download each program.

Source Start

Gagnon worked for The Source for 3 years before starting SEV. "We're a second-generation on-line service," claims Gagnon, because SEV was designed specifically for use by personal computer owners, while the older systems were set up for access by dumb terminals. The PC is used to display text in page format rather than having it seroll onto the screen line by line. The windows and extensive help messages are also generated by software running on the PC. "We're able to treat our mainframes more like file servers rather than having them take over your PC completely," says Gagnon.

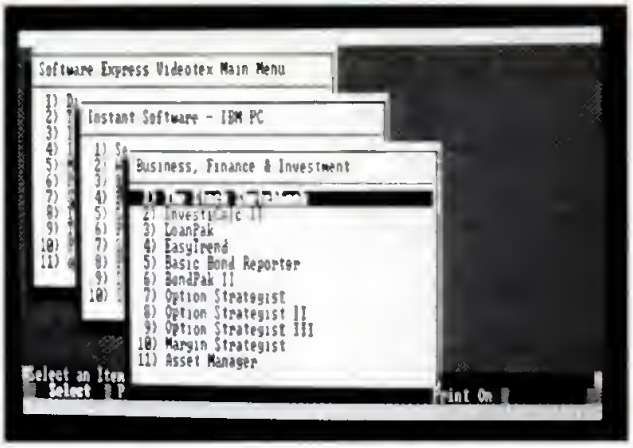
Software Express's other on-line services are Minute Mail, which provides electronic mail among subscribers, and a message and conferencing system called SwitchBoard. These services also use window commands and display their contents in page format rather than scrolling. The value of these communications services, however, will depend entirely on input from subscribers.

"We decided not to have news, stock quote, and research databases on SEV because they're not used by most subscribers," says Gagnon. "Dow Jones, CompuServe, and the Source are already superb at what they do. But your average user only hits on the AP or UPI newswire one or two times."

Gagnon saw that Source subscribers returned more frequently to download software and to communicate with other users. "By lashing the two together, we'll have the critical mass to succeed."

Nonprime access charges are about $11 per hour. By using a packet-switching system, SEV is able to offer telephone access at local rates in 150 cities. During prime periods, from 6 a.m. to 6 p.m. weekdays, rates are considerably higher. Rates are the same for communicating at 300 or 1200 baud.

Software Express Videotex is offering free subscriptions to its service. To receive information, a software catalog, and a disk of communication software for easy access to the system, contact Software Express Videotex, 3251 Cambridge Court, Fairfax, VA 22030, (703) 352-3867. ■



Menu windows help you order and download programs from Software Express Videotex.

Gimcrax Sales Fall Off-Line

Gimcrax, Inc. of Minneapolis set aside its plan to transmit the program code of retail software products to its customers. "Third-party software hasn't worked for us or anyone else in electronic distribution," says Gimcrax president Nathaniel Forbes. "The publishers are reluctant to get involved, so we decided to stop beating our heads against that wall."

Instead, Gimcrax is offering software transmission as a service for corporations that use a large number of PCs in their offices. Forbes explained that the employees in such companies create a lot of software such as *dBASE* routines, *1-2-3* templates, or full programs in BASIC or Pascal. For more efficient use, such programs can be stored in Gimcrax's SPEED>S system. Other computer users in the corporation can then locate and download software that they might otherwise have had to develop from scratch.

If a company chooses, it can exchange programs with other users of SPEED>S. Gimcrax's present customers include large insurance companies and "Big 8" accounting firms. Gimcrax, Inc. is located at 430 First Ave. North, Minneapolis, MN 55401, (612) 341-0920. —*J.L.*

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Compatibility, expandability, networking too.

With the IBM Disk Operating System, the IBM Personal Computer AT can use many programs from the fastest-growing library in the personal computer software industry.

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This member of the IBM PC Family is a powerful stand-alone computer that can also be both the primary file server and a station on your network. With the IBM PC Network (which is so easy to connect you can do it yourself), the IBM Personal Computer AT can share information with IBM PCs, PC/XTs and IBM *Portable* PCs.

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IBM Network Behavior: A Clinical Diagnosis

An evaluation of one of the first working IBM PC Network systems shows that its prognosis is good.

FIRST PERSON

BY PETER SIMSON

Editar's Nate: Duke University's Neurobehavioral Reseorch Laborotory may seem o curiaus setting in which to leorn obout the IBM PC Netwark, but that was where Peter Simson wos able ta put the system thraugh its paces. As a post-doctaral fellaw in the Department of Psychiotry ot Duke's Medicol Center, he is involved in research oimed ot better understonding the physialogicol basis af depressian. The IBM PC Netwark installed far the research praject was the first at Duke and reportedly one of the first in the natian. Simson's observotions follaw.

Having just completed installation of the new IBM PC Network for Duke University's Neurobehavioral Research Laboratory, I've had a rare opportunity to observe first-hand the network's setup and operation in a "real-life" application.

The network package consists of three basic components: the necessary hardware, DOS version 3.1, and the PC Network Program. The first step in the installation process involved attaching the hardware components of the network, a relatively painless task. Our system consists of an Enhanced Model AT serving three PCs, each equipped with one disk drive. That meant we had to place a PC Network Adapter Card in each of the four machines and then hook up standard CATV cabling from the back of each adapter card to a single, centrally located PC Network Translator Unit. An updated *Diognostics* diskette was then used to confirm that all cabling was performed correctly and that the network hardware was functioning properly.

Following hardware installation, we had to create a number of subdirectories on the server's hard disk, copy the network software from diskette to the appropriate subdirectories, and inform the network program about the particular network configuration. A menu-driven installation program included in the package automates this process, although I found it created a number of unnecessary subdirectories for my particular applications and set up certain default conditions with which I was unhappy. However, once I became familiar with the workings of the network software, I was able to customize these and many other aspects of its operation.

Messenger Service

Once the server's hard disk is configured for use in the network, it is time to run the PC Network Program on each network computer, thereby linking up all the hardware. In our laboratory, I have each of the three "messenger" PCs logged onto a different subdirectory on the server AT; these subdirectories appear as root directories to the user. By using the appropriate PATH commands and the new network APPEND command (which extends the PATH command by searching for overlay and data files), I can prevent individual users from having access to other users' subdirectories while allowing each user access to a variety of application programs.

The network program itself takes up an enormous amount of memory. My calculations revealed that, on the server AT, the program was eating up over 240K, including the 55K taken up by DOS 3.1. Each messenger PC lost over 170K to the network program and DOS. Indeed, our 512K AT is unable to run *Symphony* when on the network because of memory limitations, and I would need to increase memory on the PCs well beyond 320K in order to run it.

Peter Simson and Prudence Goodman Simson, postdoctoral research fellows at Duke University's Neurobehavioral Research Laboratory, are among the first users of the IBM network system.

As far as other applications go, I have tested *WordStar*, Turbo Pascal, Microsoft's C Compiler, Lotus's *1-2-3*, and BASICA, all of which work (some files, such as *WordStar* overlay files, must be given a "read-only" attribute using the new ATTRIB command included with DOS 3.1 in order to function properly when opened by more than one user at a time).

Traffic Jams

In terms of system performance, the AT still responds quickly when on the network, but the PCs presently access the AT hard disk at a noticeably slower rate than if they were accessing a floppy drive. This sluggish response for the PC messengers, I am told by IBM, is a limitation imposed by the network software. If network traffic is heavy, the response delays become more severe, although you can fine-tune the system by adjusting the time spent on server versus messenger tasks.

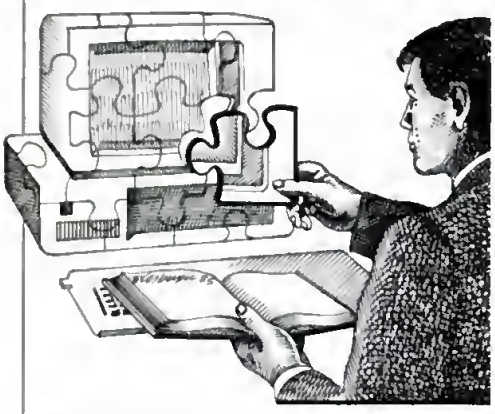
Our system has crashed twice, both times while running a popular memory-resident "desktop management" program, which appears to interfere with the memory-resident network program. Another fairly trivial complaint is that passwords entered by users at system bootup are echoed to the screen; they would be better off hidden from general viewing.

Other than that, the system is functioning well. Network requests are made by accessing the network program in either "menu mode" or, for more proficient users, "command mode". The server and messengers are able to utilize printers located at other sites on the network and to send and receive network messages. The server also has good control over network operation: Not only can it control the sequence in which jobs are printed, but it also has the ability to determine which files are being used by given users at any time. ■

COMMUNIQUES EDITED BY CHARLES BERMANT

When They Make This into a Movie It Will Be Short and Inscrutable

Add to the myriad of cultural polarities between the United States and Japan the different way computer manuals are perceived. Izumi Aizu of High Technology Communications in Tokyo, who has written the manual that comes with Apple IIc's sold in Japan, says that Japanese computer users want to know "the part before grasping the whole." To do otherwise, he adds, "can irritate the audience. We favor a gradual rather than a direct approach." For this reason, Aizu's brightly colored manual has three chapters of introduction before coming to a basic tutorial.



Aizu says that any computer manufacturer who translates manuals directly into Japanese will lose the consumer's attention in no time flat. In fact, only one American company, IBM, takes the time to create new, original documentation. Aizu himself declined to be involved with those efforts because "they wanted me to explain DOS in 30 characters or less" as a test. He declined the challenge. ■

Wire Disservice

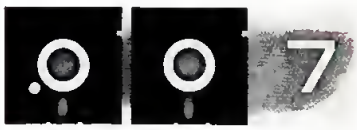
Yossarian Universal (named for *Catch 22*'s intrepid hero) may not become one of the big-three wire services, but they'll certainly pick up some fans. This farcical news bureau will generate short, satirical news items when it goes on line in a few weeks. One story the staff is currently covering is a report from Kansas that the image of Elizabeth Taylor has appeared in the bacon grease of a frying pan and is performing miracles. Ms. Taylor was not available for comment.

YU's motto is "unbelievable news for unbelievable times," and it will copy the style and method of distribution of the Associated Press and United Press International. Offering the service with The Source or CompuServe is a "possibility," says YU's Paul Fericano. And if UPI folds, YU could be hastily thrust into a position of being one of the world's top five news sources. Actually, if UPI doesn't fold . . . Well, never mind.

For more information and subscription rates, you can contact Fericano at P.O. Box 236, Millbrae, CA 94030, (415) 588-4163. ■

PC Galore

The microcomputer industry has arrived in Hollywood, having been acknowledged by one of the most sacred modern cultural icons, the James Bond movie. In *A View to a Kill*, the villain, played by Christopher Walken, attempts to achieve world domination by destroying Silicon Valley and seizing control of microchip manufacturing. Bond movies are supposed to test reality, but this one stretches things to the breaking point. Walken's malevolent character goes after Silicon Valley because the area supposedly accounts for 80 percent of chip production, neglecting the fact that chips are made in Asia, South America, and other places abroad. So much for criminal genius.



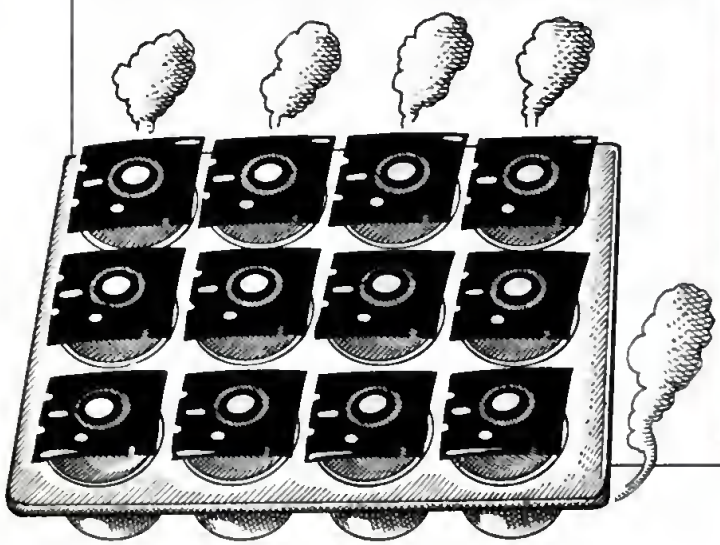
Despite all the movie's high-tech gadgetry, the only micro used in the film is an Apple IIc in Bond bimbo Tanya Roberts's bedroom. Evidently the villain was not out to dominate the MS-DOS universe, otherwise he'd have tried to destroy Boca Raton or the IBM Product Center nearest you. ■

If I'da Known You Were Comin' I'da Baked Twelve Cakes

People who do a lot of heavy-duty entertaining and have found PC-based cookbooks too restricting can now rest easy. *Food for Fifty*, the standard reference tool for large-scale caterers, is now available as a software program. The $795 nine-diskette package is perfect for anyone who wants to have the whole neighborhood over for dinner.

The program's title is a misnomer, as it's designed to plan and project costs for either smaller or much larger groups. It is targeted for use in all institutions, from Ivy League colleges and executive dining rooms to prisons and school cafeterias. The recipe range is considerable. "Anything you would find in practical institutional feeding, down to the rice and string beans, is included here," says Robert Kilgore, director of marketing for The CBORD Group, which markets the package.

If you'd like to sink your teeth into the program, contact The CBORD Group, Suite 300, First Bank Building, The Commons, Ithaca, NY 14850, (607) 272-2410. ■



Do you know me? I don't go anywhere without carrying a slip of paper that says, *PC Magazine*, One Park Avenue, New York, NY 10016; (212) 503-5276; MCI Mail 157-9301. That way, when I'm on the road and find a PC Communiqué, anything funny or unusual about computers, I can earn $50. Hey, it ain't Pepsi, but it ain't bad. ■

Some Firms Only Understand a Slap In the Face or a Slug from a .45

It's not going to be easy for Management Information Systems to battle the mighty Lotus Development Company in court over its simplified *1-2-3* manual (see "Publisher Faces Lotus Lawsuit," *PC*, Volume 4 Number 12, p. 35). But if they lose much of their first-quarter profit to legal bills, they don't have to lose their sense of humor.

MIS has unveiled a poster that satirizes the pulp detective films of yore. A decadent, tearful woman in a trenchcoat—and little else—is given the boot by a shady figure while positioned under the banner "The Book Lotus Wants Stopped." It will be run as an advertisement in several publications.

(We at *PC* find the tactic amusing, and some of us have even sunk to the level of putting the poster on our office walls. Still, the use of an out-of-context quote from *PC* in this ad may give some readers the incorrect impression that we sympathize with the MIS position in this matter. We remain neutral about the issue. We are not so neutral about the poster.)

MIS, 3543 N.E. Broadway, Portland, OR 97232, is sending out the poster with a $2 fee. ■

Illustrations by Gary Viskupic

Bugging Out

Microsoft Press has named as its publisher Min S. Yee, who comes to the organization from Ortho Information Services, a division of a company that's best known for its powerful insecticides. Perhaps Yee will use his past experience to help Microsoft work out the, er, bugs and keep the varmints out of future versions of *Windows* and *Word*. ■

Search and Replace Journalism

It occurs to me that somewhere in the manual for the widely popular *WordStor* word processing program there must be an assignment of the following kind: "To demonstrate you've mastered the features of this program, write a short book on computers and send it to a publisher. Take no more than two weeks for this exercise."

Langdon Winner, "By Words Processed"
The New York Times Book Review, May 19, 1985

Beats the "Association for the Philosophizing About Peace, Love, and Everything"

New Yorker Scott Gardner needed a name for his organization charged with solving all the world's major problems. He came up with the Institute for the Betterment of Mankind—Problem Clinic, or IBM-PC.

The name is appropriate, he explained, because an IBM Personal Computer led him to discover solutions to "poverty, baldness, runaway inflation, political corruption, and the proliferation of nuclear weapons and cockroaches," although not in that order. Using his PC, he was stricken with "an absolutely irresistible impulse to write; but about what, I did not yet know."

His processed words proved to contain modest proposals, such as one that would save the U.S. economy and end world hunger by backing our currency with the potato knish standard.

Trying to come up with a suitable name for his organization, he, as he recalls, "stared at my computer for a while, and the IBM PC's name just came to me, out of nowhere."

A collection of Gardner's worldly solutions is available from Draydel Press, 36 West 56th St., New York, NY 10019. It's titled *Stop Me Before I Write More*. Let's hope so. ■

The Mole's Gone, But The Memory Lingers On

A good computer joke is hard to find. This one, from *Mole*, a Washington-based humor publication, went predominantly unseen because the magazine folded soon after this issue hit the stands last year. Conceived by writers Art Levine and Bill Thomas, the ad was part of *No Money*, a parody magazine for the "downwardly mobile." If you mail $2 to *Mole* they won't send you a poster, but they will use the cash to refinance the publication. ■

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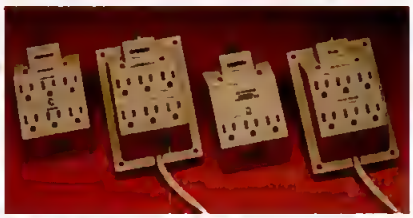

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Epson Does Battle With IBM Armed With Special FX

PRODUCT REVIEW

BY JOHN DICKINSON

NEW YORK—For those of you who don't think a global war is raging in the dot matrix printer business, consider the following events of late spring and early summer.

IBM announced a brand new, domestically designed and produced $549 desktop printer capable of 200-cps speeds, near-letter-quality printing, and single-sheet (including envelope) paper feeding. This new printer, the Proprinter, replaced the company's PC Graphics printer, which was built in Japan by Epson.

Outwardly, Epson America seemed calm about IBM's new Proprinter (see "Epson Not Blue over IBM Split," *PC*, Volume 4 Number 14, p. 38). One spokesman asserted, "We're not surprised by IBM's announcement at all." Indeed they weren't. Apparently Epson was been quite well prepared for IBM's thrust onto its traditional turf, and it seems safe to say that "the Empire has struck back."

As *PC Magazine* staffers and free-lancers were in the midst of testing Epson's upgraded, and significantly improved, FX-80 Plus printer for the forthcoming Project Printers update issue, a call came through from Epson's Torrance, Calif., headquarters. "Drop everything," said an Epson spokesman, "We just put a brand new FX-85 printer on an airplane bound for New York."

What's an FX-85? Clearly it's Epson's response to IBM's Proprinter, and its features and performance show that the wily Japanese company is prepared to do battle with Big Blue. Epson's new printer incorporates the improved paper mechanism and other mechanical improvements of the FX-80 Plus and adds two significant features. The FX-85 can produce the entire IBM PC character set, including the text graphics characters and both foreign language subsets, and it produces a near-letter-quality (NLQ) mode that rivals all but the best 24-pin Toshiba printers. Its NLQ mode is clearly superior to the Proprinter's.

Epson FX-85
Epson Corporation of America
133 W. Colorado Blvd.
Pasadena, CA 91105
(213) 449-1276
List Price: $499

Clearly the FX-85 is Epson's response to IBM's Proprinter, and its features show that the company is prepared to do battle with Big Blue.

Maintaining Tradition

Epson hasn't abandoned its own traditional character set in the FX-85, or its low-price reputation. The FX-85 can still produce Epson's traditional italic characters when in native mode (you can use an easily accessible DIP switch to set the IBM mode), and the printer comes in at a startling $499. The companion FX-185, a wide-carriage version that incorporates all the FX-85's features, will cost only $699.

Perhaps the best news of all is that Epson hasn't abandoned its earlier FX-80 and FX-80 Plus customers. Upgrade kits for these two favorites will be available shortly for dealer installation. The price for the upgrade, not yet final, is expected to be in the $75 to $85 range.

Rated at 160 cps, the FX-85 isn't quite the high speed performer IBM's Proprinter is. It clocked an even 80 cps in draft mode, versus the IBM's 91, and in near-letter-quality mode, it ran at 21 cps, while the Proprinter did 31 cps. (The tests were run using *PC Magazine*'s standard printer speed test.) But, Epson's new printer is significantly quieter than its counterpart, rating a mere 75 dBA versus the Proprinter's near ear-popping scream of 82.

The FX-85 includes all the Proprinter's highly touted features but goes IBM's product one better by adding proportional spacing. And then, of course, many people find Epson's standard italic characters desirable for word processing applications. Both printers are compatible with the DOS GRAPHICS screen dump facility, but that's no surprise since Epson invented the standard by which IBM graphics compatibility is measured.

Double Dipping

One minor problem with the FX-85 is that standard Epson features such as 12 pitch, italics, and proportional spacing are not available while the printer is hard at work in its IBM mode. A front-panel switch, however, gives you access to the near-letter-quality feature. As a result, most users will probably end up using the printer in Epson mode for word processing and IBM mode for other applications. The easy accessibility of the FX-85's DIP switch reduces this change to a petty annoyance rather than a real problem.

Single-sheet feeding is available in the FX-85, and envelope feeding is possible. But the Proprinter's design is clearly superior to that of the FX-85 for feeding both single sheets and envelopes. For that matter, the Proprinter has it over just about anything else on the personal computer printer market in this particular area.

But the Epson Empire has, indeed, struck back with the FX-85, and swiftly at that. Will the blow be strong enough to throw back Big Blue's invasion of its traditional turf? It's hard to say. If an 11-cps difference is enough to make you spend another $50 for a US-made product with IBM's logo on it, the Proprinter will win your heart. But, if superior near-letter-quality printing and quiet operation are more your style, you'll go for the Epson. Given that Epson printers are more heavily discounted than anything made by IBM, you may just decide to sit under the rising sun in any case. ■

Photograph by Thom O'Connor

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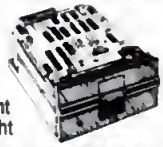

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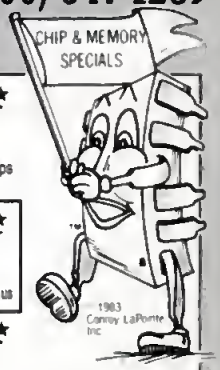

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CIRCLE 243 ON READER SERVICE CARD

PC UPDATE BY VIRGINIA DUDEK

NEW YORK - Thoae who think in Gantt and Pert charta may be interested in Applied Businesa Technology Corporation's updated Project Manager Workbench. Veraion 2.1 can now preview on-screen output reports on the aystem and then integrate them into a word processor. This lets users take one or more reports from the aystem and rearrange documenta that are auitable for presentatations. For reaources that are part of more than one project at a time, Veraion 2.1 can report on and manage resources across projects. Alao, the Gantt chart calendar scale is increased to a maximum of 45 time periods, broken up into either weeka or months. Worth mentioning: Version 2.1 requires 384K of memory.

Updatea are available from ABT. If you bought the maintenance contract ($250), you'll automatically receive one. If you bought Project Manager within 90 days of the update's release, ABT will send you Version 2.1. Contact ABT in New York for details.

* * *

If there's a draft in the room, it could be because Autodesk, Inc. of Sauaalito, Calif. haa released Version 2.1 of its AutoCAD design package. New featurea include a 40 percent apeed increase over Version 2.0 for users with math coprocessors, an interactive pick function that prompts users for design information like coordinatea, and a variable and macro facility for creating custom commands and functions. The Advanced Drafting Extenaion 3 module's visualization capability (or "2 1/2-D") edits, creates polylinea, and performs wire framing and hidden line drawings. In addition, Autodesk and CADCOR of Mountain View, Calif. have developed a translator that moves files between AutoCAD and IBM's CADAM mainframe deaign software. "This is what the microcomputer revolution is all about," claima Autodesk president John Walker. Upgrades to Version 2.1 coat $500. Contact Autodesk for details.

* * *

Juat out from Digital Research of Monterey, Calif. ia Version 4.1 of Concurrent DOS. The multitasking, multiuser operating system now allows microa to run MS DOS or CP/M application programs simultaneously. Two attached aerial terminala may be added that each run one additional application at the same time. Thia meana up to three uaers can operate one computer simultaneously. Version 4.1 also runs on the AT&T 6300, the Compaq Deskpro, and the IBM PC AT, and includea integrated networking capabilities. Contact Digital Research for upgradea.

* * *

Deciaion Support Software, Inc. of McLean, Virginia announced Veraion BE3 of Expert Choice. The deciaion aupport system now haa a link to Lotus 1-2-3 and an enhanced what-if capabilitie that lets users adjust a numerical value in a what-if situation and have that difference equally diatributed over other criteria. A "quick and dirty" feature lets usera weight decisiona numerically and thereby make fast on the apot deciaiona. Updates are available directly from DSS. Send $50 for new program disk and additional documentation or $75 for new program and a new manual.

* * *

Short takes: Veraion 2.0 of iRr'a WP Toolaet now converts from the IBM DCA RFT format to the ASCII format, but NOT from ASCII to RFT. Also added are ASCII/EBCDIC translation and a filter to transform filea according to any aet of subatitutions provided by the user. Contact iRr in Concord, Mass. for upgrades...Release G of Network REVELATION from Coamos, Inc. in Seattle, Wash. now runs on IBM's PC Network, Nestar's Plan 3000, and other networka running Novell NetWare. A new file structure offera 10 times faster access time. Note that all previous versions will run on Release G; however, object code generated with G is incompatible with Release F and earlier. Registered users send $100 for new manuals and system disk. For system disk alone send $50.

Be a contributor to PC Update. Write or call Virginia Dudek, PC Magazine, One Park Avenue, NY, NY 10016 (212) 503-5265.

Borland's Kahn Wages His Big Macro Attack

BY STEPHEN MANES

Since the introduction of Borland International's feature-laden *SuperKey* package in late May, one of the hottest battles in the PC world has raged over a product once considered a lowly utility: the macro processor.

"I don't think you can get a better bargain in micro software today," crows Borland president Philippe Kahn, itemizing *SuperKey*'s file encryption, keyboard and screen control, DOS command editor, and macro functions.

David Rose, *ProKey*'s inventor, doesn't agree. "We don't think a features war is good for our customers." Although his *ProKey 4.0* has many new functions, Rose emphasizes his product's reliability and service. *ProKey* has been on the market since August 1982.

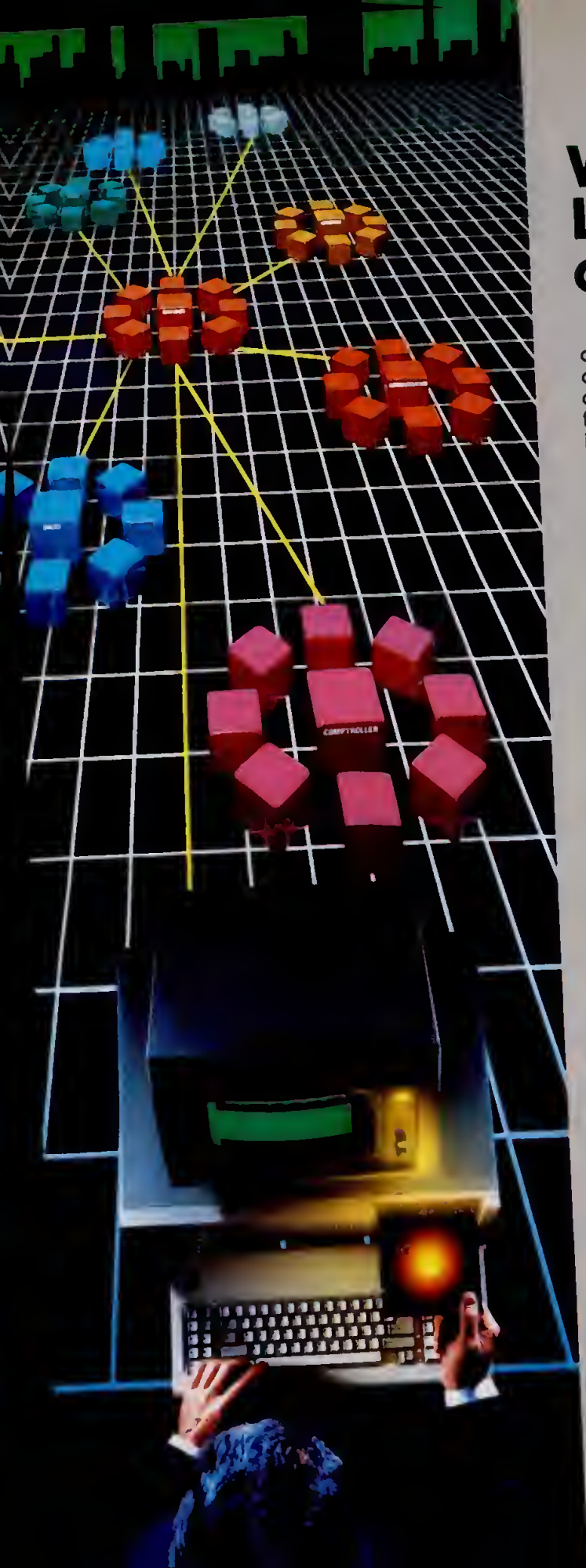
"Customers want support, cooperation, and synergism among products," Rose says. Critical of Borland's failure to make its *SideKick* desktop program fully compatible with his already-established product, he characterizes the firm as "secretive and aggressive."

Rose notes that *ProKey* is widely available between $75 and $85, not much more than *SuperKey*'s $69.95 introductory list price. With a site, multiuse, or OEM license, he adds, "the cost per unit can be far lower than Borland's price."

Kahn considers that comparison unfair. He points out that his firm's products, are often sold at discounts from the list price. Borland has also been involved in site licensing.

"Anytime anyone wants to know something about our products, we're very open," Kahn says, pointing to Borland's involvement with the Pascal standards committee. The firm is currently consulting with Microsoft to ensure that its products will work properly with DOS 4.0. "We try to do products that are the best in their category, regardless of price. We could sell *SuperKey* for much more," says Kahn. "We want to open up this market."

On that final point at least, Rose agrees. "We're glad that the press is paying a great deal more attention to this niche of the market." ■



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CIRCLE 393 ON READER SERVICE CARD

DOWN TIME BY WINN L. ROSCH

Keyport 300: A Functional Alternative to Keyboards

When Hollywood swings into its next horror film cycle, I fully expect the movie moguls to aim at today's nouveau-Yuppie audience with a feature called *The Keyboard that Ate the Office*. For the last hundred years no device has struck as much fear in the hearts of executives as the common typewriter keyboard. A confrontation with one can turn the most macho executives, those who would laugh in the face of a werewolf, Dracula, or Joan Rivers, into quivering, gibbering wrecks.

Little wonder, then, that one of the bubbling subindustries in personal computing concerns itself with keyboard alternatives: voice recognizers, mice for finger and foot, joysticks and trackballs, touch screens and touch tablets—everything but mindprobes, and maybe even those come next Thursday.

While the motivation behind many of these products seems to be that the world needs a new interface philosophy or metaphor, Polytel Corporation is more modest. The folks there apparently believe all we need are more and better function keys.

The result is a new product, the Keyport 300, a touchpad with a difference. Instead of free-form drawing—something even a keyboard coveter like me will concede is not QWERTY's forte—the Keyport 300 promotes itself as being a giant array of function keys.

Peter Maxed-Out

The Keyport 300 even looks exciting, a fantastic plastic overweight drawing board with an interchangeable mylar overlay decorated with what looks like a combination of an overcharged rainbow, press-on letters, Marc Chagall remnants, and visual symphonies produced by a large dose of lysergic acid diethylamide.

The seemingly random explosion of word and color is not without design. Various function keys are delineated by color and position on the large pad. Instead of pressing strange key combinations to make your favorite word processor or spreadsheet (or even the one that you use and constantly complain about) bend to your wishes, you just need to tap the right place on the Keyport 300.

The enhanced function key concept is hardly unique to the Keyport 300. Compared to most other add-on arrays of function keys, however, the Keyport 300 holds an advantage. The wild and colorful free-form layout of the command selection areas should make it easier for you to fight through the forest of its functions. The colors and key arrangements help you quickly find and remember every function. At least you aren't confronted with 10 thousand look-alike keys.

As a side benefit, the Keyport 300 plugs into a game adapter, and so you don't have to tie up a valuable serial port to use it.

Rough Edges

Alas, the Keyport 300 is far from perfect, both in design and implementation. Like most brand-new products, the Keyport I received had a few rough edges. Polytel's workmanship proved far from precise. The overlays did not properly fit onto the alignment pins on the Keyport 300 pad, curling and buckling no matter how I installed them.

Although the software Polytel supplied, called *Keyware*, was good, it could not work miracles. Many wonderful functions stenciled onto the command overlays won't work with all programs. Adding an overlay won't give *WordStar 3.3* an Undo key, for instance.

Dig deeper and you'll find more bothersome problems: Using the Keyport 300 in the office may slow things down, even if you are only an adequate typist. Positions and colors may be easier to learn than the keyboard, but after you get going, you'll have to move your fingers from their precious home row on the keyboard and then move them back. If you do a lot of editing, not only will things go slower, but your arms will get tired. The Keyport will cause more fatigue and be a big time-waster. On top of all that, it adds more clutter to your desk.

As an office worker, I would be content if the Keyport 300 in its present form would crawl back into the black lagoon from which it emerged. But underlying the Keyport 300 is an important technology, one I'll wager we'll be seeing more of.

But forget about using the Keyport 300 for the office-based PC keyboard. It can be a more valuable tool for machinists. In the hands of a machinist running a lathe or boring mill, it may be the perfect interface. Able to withstand harsh environments and harsh words and equipped with enough room on the board for innumerable commands that can be quickly found and remembered, the Keyport 300 can serve as the primary control for the PC that runs the whole shop.

Dream Machine

If you take the Keyport 300's underlying technology another step, the Keyport 301 might become every editors' dream and perhaps the most natural word-working interface imaginable. Here's how: Instead of overlaying the Keyport 300 pad with an immutable plastic sheet, lay the pad (or a transparent version) over an LCD display, or lay a flexible LCD display over it. Mix in one grandiose software package that allows you to take your stylus and circle the words or the spreadsheet cells that appear on the pad and move them by leading them along with the stylus. Presto! You have an editing tool par excellence, one that will save keystrokes and restore some familiarity to the editing process.

Oh, sure, you can do the same thing today with your CRT, a light pen, and some software no one has bothered to write. Light pens, however, can be amazingly heavy when you use them for any length of time (although they too have their strong suits).

The pad-and-LCD combination can put the visual medium back into your hands—exactly like the familiar sheet of paper on a clipboard. I bet that would fix some vision problems, and make people a lot happier with their computers. ■

Keyport 300
Polytel Computer Products Corporation
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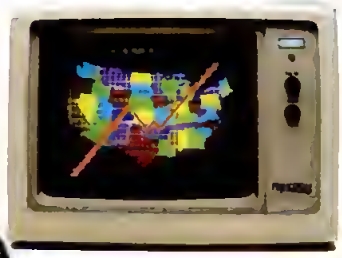

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CIRCLE 224 ON READER SERVICE CARD

PEOPLE IN THE NEWS

Note Well—Dragonfly Founders Plan to Soar

BY STEPHEN MANES

Four years ago Steven Siebert was a graduate philosophy student who had never so much as laid hands on a computer keyboard. Today his company, Dragonfly Software, is emerging from its pupal state with a high-flying takeoff. *Noto Bene*, Dragonfly's new integrated word processor and text-based management program, has just become the first program to receive the official blessing of the influential Modern Language Association (see "MLA Gives Top Grade to Dragonfly Software," *PC*, Volume 4 Number 15, p. 64).

He joined the computer age in November 1981, when he bought a 64K single-drive IBM PC to help with his Yale doctoral dissertation, titled "The Hermeneutics of Suspicion." After cutting (and gnashing) his teeth on *EasyWriter I*, the only word processing program then available for the PC, he switched to *The Final Word* the moment it arrived. Still, he soon was hunting for more capabilities than even that relatively powerful program had to offer.

Star Search

In that quest Siebert, now 32, became a fixture at meetings of the New York PC User Group meetings, where he was noted for railing against his *bete noire*, the word processing standard *WordStor*. Fellow academics ready to take the PC plunge but unable to find knowledgeable dealers quickly adopted him as their computer guru. Siebert parlayed his knowledge of their needs into a part-time hardware and software consulting business run from his one-bedroom brownstone apartment.

Still working on his dissertation, Siebert kept hoping for better software to come along. He envisioned a single word processing program replete with features important to scholars—footnotes, table of contents, indexes, bibliographies—and including a special free-form database manager to allow unlimited retrieval of text.

Dragonfly's triumvirate: Deborah Reumann, Steven Siebert (top left), and Loren Siebert.

In 1983 two new products gave him a glimpse of what he was after: *XyWrite II*, a fast, powerful word processor, handled footnotes better than any other program he had seen; *FYI 3000* was able to index free-form text files. Originally Siebert intended to develop simple *ProKey* macros to offer a rudimentary interface between the two programs. But favorable response to a preliminary version he exhibited at the MLA convention in December 1983 convinced him to "do things right." He decided to license the two packages and modify them to work as a unit.

Though outside investors offered assistance, Siebert chose to tap family resources for capital and sweat equity instead. When his wife, Deborah Reumann, discovered her job as coordinator of a Brooklyn shelter for the homeless would no longer include a salary, she joined the project, heading up the marketing effort. Siebert's brother Loren added an infusion of cash and then abandoned his job as a technical writer in Japan to create the documentation for *Noto Bene*.

Academic Needs

Siebert takes pains to emphasize that *Nota Bene* is not just a repackaging of its two component parts. "Both are excellent programs," he acknowledges, "but we've added many features and modified the programs extensively to work as one unit." He points to *Noto Bene*'s unique logical keyboard layout, versatile footnoting, indexing, bibliography, and style options, printer support, and its facility with foreign characters whose accents, umlauts, and tildes give many word processors fits. "One reason I decided to get into this was discovering that the MLA's own mainframe database can't handle foreign characters. Ours can."

Dragonfly believes the program is not just for ivory-tower types. Siebert says the free-form text database will be particularly useful for future revisions to the program's documentation and adds that lawyers, journalists, and others who store multiple versions of similar documents or take copious notes are already among *Noto Bene*'s boosters.

Like many software projects, *Noto Bene* was plagued with delays. Siebert ruefully admits he originally promised a finished product for January 1984; Version 1.0 of the program shipped on Valentine's Day 1985. One major frustration was copy protection, which Dragonfly is abandoning. Version 1.1 of *Nota Bene* will be what Loren Siebert calls "copy-traceable": The program may be copied after the master program is installed, but all copies can be traced to the source since the installation procedure requires that the original user's name become a permanent part of the startup display. Siebert hopes this will prevent unauthorized users from obtaining free upgrades and might be useful in tracking pirated versions of their program. Version 1.1, which began shipment in June, includes form- and mail-merging features and a built-in programming language for inveterate customizers.

The Dragonfly group was delighted when Version 1.1 flew out the door of its tin-roofed offices above downtown Brooklyn's Fulton Mall (and, soberingly, across the hall from the city marshal's process-serving division). "None of us has had a paycheck since we started this," says Siebert.

And what about "The Hermeneutics of Suspicion"? Well, so far, Siebert just hasn't had time to work on his dissertation with the tool he designed expressly for that purpose. ■

The MicroAge Of Television

BY CHARLES BERMANT

TEMPE, Ariz.—"Live! From Tempe! It's Thursday Afternoon!" Well, not quite. There won't be any crowded bars with eager viewers watching on a 6-foot screen, but MicroAge, a major computer retailing firm, expects "mahhhvelous" results from MCS-TV

MCS-TV is a venture in "narrowcasting," producing and sending television programming to a narrowly defined audience. In this instance that audience is MicroAge's dealers and customers.

The service, with 20 hours of weekly programming, is part of the chain's philosophy of service, training, and support that accompanies each sale. Jeff McKeever and Alan Hald, president and chairman of MicroAge, respectively, say they have attempted to sell their customers total systems solutions long before integrated hardware configurations were offered by manufacturers.

MicroAge's Jeff McKeever (left) and Alan Hald

With about 150 stores nationwide and more in development, MicroAge is possibly the fastest-growing franchiser in the trade, especially in light of its 36-store total just 2 years ago.

Cult of Systems

McKeever and Hald don't accept just anyone into the MicroAge fold. Hald says that the four requirements for a client are an overall business maturity, ability for sales management, understanding of technology, and adequate capital—it takes $300,000 to $1 million before a franchise's doors open.

McKeever says that microcomputer retailing is now in a period of change, similar to the transition from the hobby stores to the early computer retailer. He adds that a "smell of death" permeates office equipment stores, and he expects those outlets to be replaced by systems-oriented outlets. MicroAge, in fact, offers office supplies in several stores.

He says PCs are now starting to be used as productivity and organizational tools. "Computer dealers will need both sales and technical expertise to succeed, and a background in systems integration rather than just peddling boxes."

"The original concept of MicroAge was to be a solution store," Hald says. "We wanted to solve problems instead of selling technology for its own sake. You can't just retail a product. Buying the cheapest product is the worst way to buy."

Nor does he have a complimentary view of other computer stores. "The concept of a PC store is on a dead end evolutionary path," he says. "They have a myopic mentality. I compare it to people sitting on the curb of a highway: They see that there's something on the other side of the road, but when they get up to cross, they're so myopic that they can't see the cars coming and get hit."

I Want My MCS-TV

When MCS-TV goes on the air this fall, it will be beamed to 20 MicroAge stores on a test basis. Half of the programming will be vendor-sponsored training, while MicroAge will sponsor specific programming for the other half. Hopes are that MCS-TV will be in every MicroAge store in 1986.

Some of the proposed programs are "Building Your Construction Sales," "Multiuser Systems and LAN Update," and "Selling Open Systems Accounting Software." Product announcements will be included, and many programs will be interactive, allowing those in MicroAge stores to participate.

In a way MCS-TV is a real-life version of the old joke about TV programs interrupting the commercials, and there is little worry that Ted Turner will try to take it over. However, if McKeever and Hald are correct, their foray onto the airwaves might just change the way PCs are sold and supported in this country. ■

TRANSMISSIONS BY CRAIG L. STARK

A linkup to the lowdown about what's happening on PC Magazine's Interactive Reader Service.

Now logging nearly 100 calls a day, *PC*'s Interactive Reader Service lets readers use their modems to download programs, utilities, indexes, and the like, as they are published in *PC Magazine*. This column will keep you up-to-date on what's new on PC-IRS.

If you're not already among the several thousand readers already using the system, here's all you have to do. Set your modem for 1,200 (or 300) baud, no parity, 8 data bits, 1 stop bit (our recommendation, though we will automatically adjust to other common settings), and set up to receive using the Xmodem file-transfer protocol. If your communications software does not support Xmodem (like older versions of *CROSSTALK* and *SmartCom II*), we can transmit all but .COM and .EXE files to you in straight ASCII. Xmodem's built-in error-checking capabilities make it the method of choice for all downloading, however.

You can call PC-IRS at (212) 696-0360 24 hours a day, 7 days a week. The service is free (except for your phone bill). If you get a busy signal, keep trying: At present we can support only two users at once, though we will soon be installing a seven-user system. If your display is blank or full of obvious garbage when you connect, just hit a carriage return or two and you should receive our sign-on screen properly.

PC-IRS will continue to supply the full assembly language listings (.ASM files) for our Programming Column offerings, even though space requirements have forced us to curtail printing them in the magazine. The .COM, .ASM, and .ASC (BASIC) files for Steve Holzner's SNAPSHOT, KEEPER, and CACHE utilities (Volume 4 Numbers 14–16) are the most recent Programming features available in a list that includes all columns back to December of last year. Core International's DISKP.EXE hard disk benchmark test continues to remain popular, as are our listings of PC user groups (PCUG) and additional PC bulletin boards (PCBBS). PCNDX1.TXT and PCNDX2.TXT, our two-part index to all issues of *PC Magazine* Volume 3 (1984) take a while to download (117.5K and 34K, respectively), but they can save you lot of thumbing through old table of contents.

Our directories of downloadable files grow almost daily, often in response to the requests you make through our Comment facility. So check out our listings the PC-IRS way. ■

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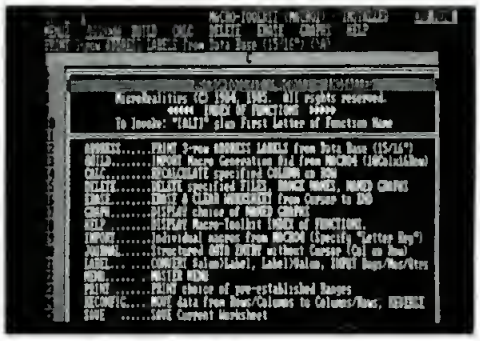
CIRCLE 270 ON READER SERVICE CARD

THE SHORT REPORT BY PHIL WISWELL

Mastering Managers, Macros, and College Placement

DB/Editor/Writer *from IBM Personally Developed Software*



Macro-Toolkit *from MicroRealities*

DB/Editor/Writer

I don't know how IBM Personally Developed Software has managed so many winners, but here's yet another: *DB/Editor/Writer*, a flexible record-keeping and report-writing program for personal and small business use. The program includes sample databases for managing a checking account, mail/phone directories, mail merge, billing/pricing, expense accounts, and bowling team records and averages.

Each record can use up to 32 fields and 500 characters. With 256K you can squeeze nearly 2,000 records onto one database; with 640K you can have 7,500 records. Fields can be searched/sorted using logical and Boolean operators, and my tests confirmed good speed: The program sorted 2,000 records in less than a minute. The program's menu for the function keys changes as you press Alt, Shift, or Ctrl, a brilliant detail that simplifies every operation. Databases are stored as ASCII text files; thus output can be used by other programs that process text files and vice versa. *DB/Editor/Writer* can also format data to DIF format for spreadsheet use. Manipulating databases with BASIC couldn't be much easier. *DB/Editor/Writer* (IBM Personally Developed Software, P.O. Box 3280, Wallingford, CT 06494; $49.95 plus handling; for PC, XT, AT, PC*jr*; requires 128K RAM, DOS 1.1 and later).

Macro-Toolkit

The use of macros in the design, redesign, and analysis of a *1-2-3* worksheet makes your work easier and less time consuming. But if you don't want to write the macros yourself, *Macro-Toolkit* offers you a good selection of one-stroke tricks that are easily implemented. Just File-Retrieve or File-Combine-Copy the toolkit you want into your worksheet, then invoke a macro with the Alt key plus its first letter. If your worksheet makes you sweat for the data you want, maybe it's not the fault of the carpenter but of the tools. *Macro-Toolkit* (MicroRealities, Box 60123, Grand Junction, CO 81506; $35 plus handling; for PC, XT, AT, PC*jr*, and compatibles; requires 128K RAM, DOS 1.1 and later).

Macro-Toolkit contains a demonstration file and four "toolkits" or templates that provide 15 handy macro functions, from printing address labels to converting formulas to values, and it has the ability to generate your own macros. Certain functions are new to *1-2-3*, such as reconfiguring data from rows to columns and vice versa. Others macros automate or increase the power of existing *1-2-3* commands. For example, you can "chain" column width adjustments. Great stuff.

Below the Root

The world of *Below the Root*, rich in graphics, action, and fantasy role playing, is based on *The Green-Sky Trilogy*, a classic children's tale by Zilpha Keatley Snyder that takes place among the branches and roots of seven enormous trees where the inhabitants of Green-Sky live. You control a character who can walk, run, jump, crawl, and glide on wings through the more than 500 screens that comprise the game. Along the way you find many dwellings, most of them inhabited by other creatures with whom you must interact. A menu of several dozen actions like speak, take, and examine offers you many choices.

The object of *Below the Root* is to decipher an intriguing message that will save the inhabitants of Green-Sky from certain doom. But you set out knowing no more than that, and only through persistent cleverness will you begin to understand the rules of this strange world. It doesn't matter if you're 14 or 40 years old: If you're into fantasy, you'll love this game. Take a formatted data disk with you, though, because you will be a long time *Below the Root* (Windham Classics Corp., One Kendall Square, Cambridge, MA 02139; $26.95; for PC, PC*jr*, and compatibles; requires 128K RAM, color/graphics).

College Directions

Summer is traditionally the best time to travel around the country shopping for a college, and preparation is the key to a successful trip. High school guidance counselors and public libraries are your main resources. Here's a very good supplement: *College Directions* (Systems Software Associates, Inc., 723 Kanawha Blvd. East, Charleston, WV 25301; $185 plus handling; for PC, XT, AT, and compatibles; requires 128K RAM).

Basically, *College Directions* is a current database of 1,300 four-year colleges and universities. You select criteria (tuition range, type of major, admission standards, size of school, and so forth), give them an order of importance, select five states, and wait for a printout listing the colleges that fit your requirements along with their states and reference numbers. You can then explore particular colleges, estimate costs, and receive a very handy printout. The program will also write a letter to the college of your choice. Packing is up to you.

Liptocoe

With so many programs vying for space in this column, I found it quite easy to leave the game *Liptocoe* untouched in my in-box for several weeks, which is too bad because *Liptocoe* is a good action game.

Liptocoe (IBM Personally Developed Software, P.O. Box 3280, Wallingford, CT 06494; $19.95 plus handling; for PC, XT, PC*jr*; requires 128K RAM, color display) is a munch-your-way-out-of-the-maze game. Not quite Pac-Man, but related. Your character begins each of 50 very different levels in the center of a maze of walls, death mines, halls, rooms of edible dots, and an exit door that you can open only by eating enough dots. Of course, you're being chased the whole time by four enemies. A nifty screen editor allows you to create, store, and play up to ten original levels. Too bad it doesn't let you rewrite the title. ■

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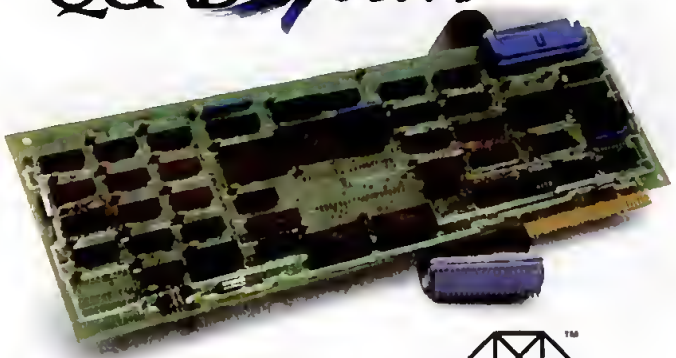

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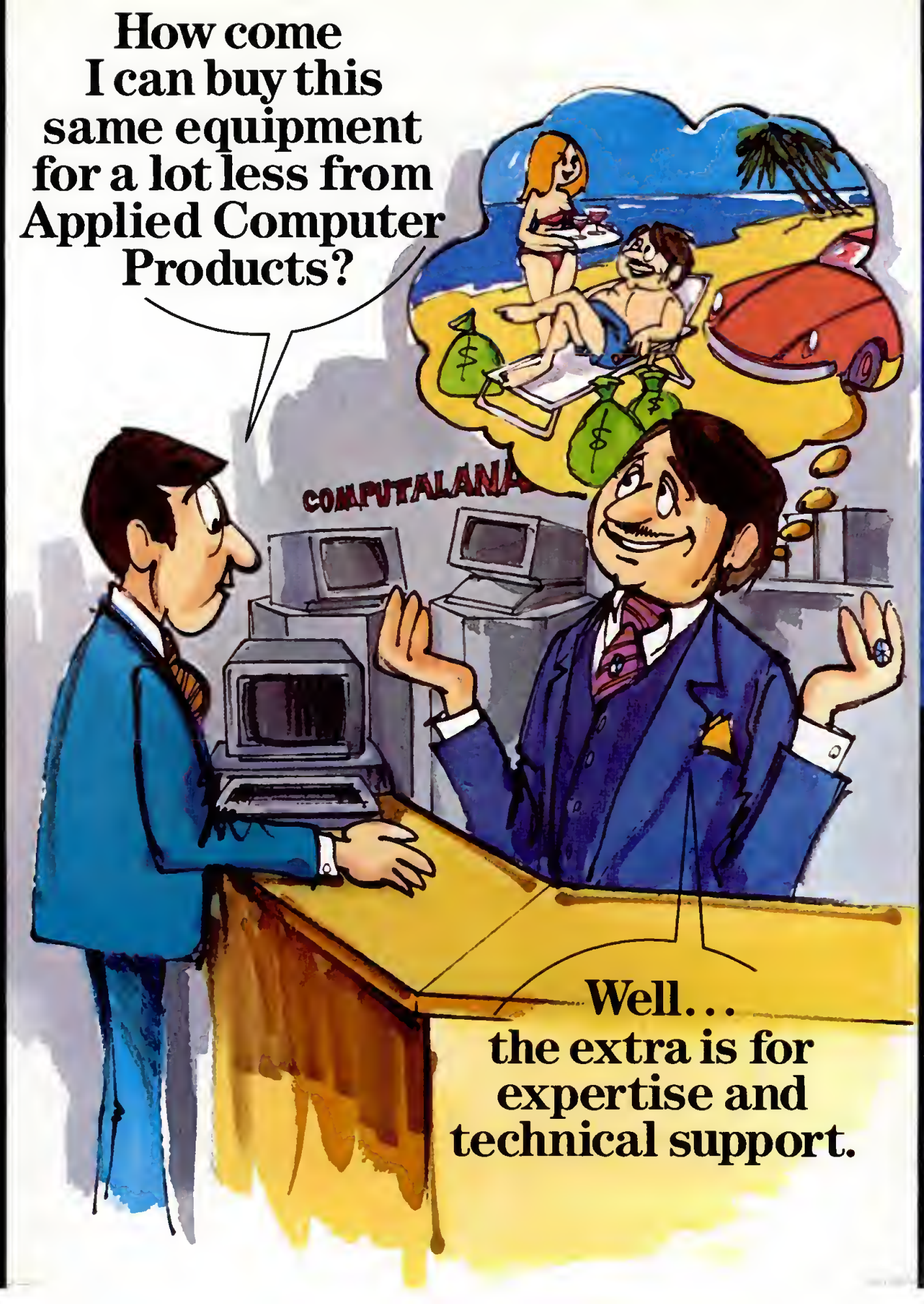
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PARITY CHECK BY STEPHEN MANES

Learning a Hard Lesson From Borland's Turbo Tutor

I keep telling myself I'm going cold turkey. I keep saying that henceforth I will not allow a single line of code to pass my fingertips. I keep repeating that programming drains my resources, damages my psyche, and eats up my time. I keep insisting that programmers should do the programming and we users should do the using. Then I think up some new gimmick I absolutely can't do without and fall off the wagon into the evil clutches of late-night spaghetti code.

How can I help it? I can't load programs or change the colors on my screen at the touch of a button. Say I need to keep a batch file from echoing commands to the screen. Say I need a BASIC program module to change the color of text, background, and border and maintain them on returning to DOS. The only thing for it is a little programming. Easy stuff, though. Nothing to it.

Life's a Batch

Ha! The batch file works just fine on my machine, but some kind of insidious bug in other versions of DOS keeps the ECHO command from working properly. The first person who tries the batch file instantly inquires, "What's all this garbage all over my screen?" Because he vaguely remembers hearing something about the bug, it takes us only 5 minutes to dope out the problem and a mere 15 to devise a foolproof workaround.

Then I try out the color-change part of my BASIC program. Surprise! It works fine until I get back to DOS, which steals the colors back to plain vanilla-on-licorice. Since I'd gotten this kind of thing to work properly before in some program or other somewhere on one of a hundred or so floppy disks someplace, I do the only reasonable thing under the circumstances: Phone my friend the BASIC expert.

Some peculiarity of WIDTH and other screen-control commands, it turns out, makes them very fussy about the order in which you call them. Is this documented anywhere? The expert simply snickers and guffaws. "That's programming," says he. "If you do it all the time, you learn where the bugs are."

Snort Retorts

I make the mistake of relating all this to a Pascal guru. "Serves you right for using BASIC and that so-called batch file 'language,' " he snorts. In the programming hierarchy, the only thing lower than a BASIC amateur is a tenderfingers who doesn't program at all.

So I investigate Turbo Pascal. It gets virtually unqualified raves from Pascal experts. It's cheap, it comes complete with its own full-screen *WordStar*-like editor, it compiles code fast in one pass without the need for the DOS linker, and it gives clear error messages that often take you right to the scene of the crime. It's the kind of programming environment we BASIC patzers wish we had. And Borland's instructional aid, *Turbo Tutor*, promises to take me through the mysteries step by step.

Alas, *Turbo Tutor* turns out to be the one Borland product I've seen that's not much good. It's mostly a book with a disk of samples thrown in to save you typing. That's not inherently terrible: The BASIC tomes that used to come with the PC*jr* and Apple (and for all I know, still do) were pretty darned good. But *Turbo Tutor* doesn't include enough examples to make you really understand what's going on, and many of its lessons are tied in to ancient hacker rites like the incomprehensible *Star Trek* games.

> The only thing lower than a BASIC amateur is a tenderfingers who doesn't program at all.

Worse, some of the examples don't run and aren't meant to. It's not the book's fault: the trouble is a feature of Pascal that real programmers love and amateurs detest. *Turbo Tutor* calls it The Great Underlying Rule of Pascal: All identifiers must be declared before they are used.

You can't just type in a Pascal subroutine and see what it does. The whole program must be thought out before a word of code gets on the screen. The very idea behind Pascal is to force you to think and program in an officially approved, structured fashion; Pascal was designed to be used as a teaching language.

Fast and Dirty

But so was BASIC, and its beauty, at least in its microcomputer versions, is that it lets you throw together a quick-and-dirty program fast. It may not be elegant; you may not care.

BASIC's syntax is a hell of a lot more intuitive than Pascal's. It does the worrying about your variables so you don't have to. And IBM's BASIC includes all sorts of highly machine-specific functions, particularly with regard to screen control, for which you may have to write a lot of code (or buy prewritten routines such as *Graphix Toolbox*) in Pascal. BASIC code isn't portable; so you wouldn't use it to develop software to run across a whole spectrum of machines, but nothing beats it if you want to turn your screen red in a hurry without spending months learning a new lingo. And the BASIC world is likely to get better: Borland plans to release a Turbo-style BASIC compiler before the end of the year.

In a sense, every application program really functions as a specialized and limited programming language that helps you get your computer to do what you want it to. Increasingly, users needn't bother with "real" programming languages at all. Two years ago I wrote a rudimentary four-function calculator in BASIC; today I use the much better one in *SideKick*. Borland includes the source code for a rudimentary spreadsheet with every copy of Turbo Pascal; what it teaches is that you're not likely to beat Lotus's *1-2-3* by rolling your own.

Knowing something about programming does make many things easier to use: DOS batch files, macros, and database software, to name a few. But nowadays you're not exactly out in the cold if you don't program. In fact, you may actually experience the heady feeling of getting something useful accomplished with your machine. ■

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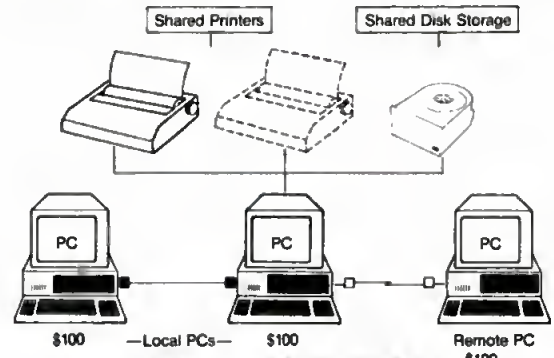

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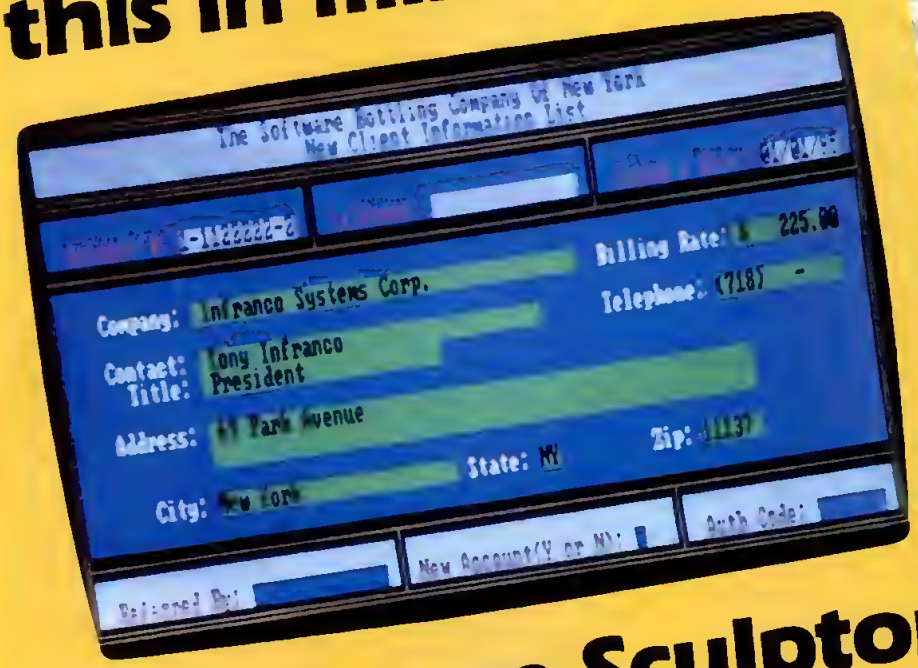

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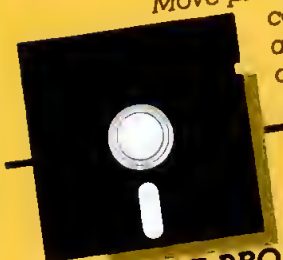

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Out of the Mouths of Babes

Children's innate curiosity and self-confidence make them exceptional learners. But they also have something to teach users and programmers alike: how to ask the question, why?

"Hello?"

"Hi, Daddy!"

"Hi, Stephanie. How are you?"

Stephanie is my 3-year-old daughter. She's never called me at work before.

"Fine, Daddy. Um, I have a question about your computer. How do I make it go in color?"

I have a Compaq Plus at home, with a Sears RGB monitor/TV set to augment the built-in 9-inch green screen. The Compaq has both color and mono modes.

"Do you have the machine on?"

"Yes."

"Find the key that says C-T-R-L on it and the one that says A-L-T. Then find the one that has a little arrow that points at the M."

"Ummm. Okay."

"Now press all three of them at the same time."

"Oh. Now it's in color. Thank you, Daddy."

Click.

Stephanie has been using a computer ever since she could sit up straight at the keyboard. Does this mean she's a prodigy? No. Sure, she's smart, but so is everybody else's kid.

She has access and encouragement, which is all children need to fire up their incredible learning engines. She also has a small collection of favorite programs. Her first was *My Letters, Numbers, and Words* by Nighthawk Computing. It taught her the alphabet, numbers to ten, and some simple words. Even its most mundane alphabet drills hold her interest because an occasional mouse darts across the screen or an inchworm wends its halting way.

IBM's *Bumble Games* has, if you can believe it, taught her about *x-y* coordinates, left and right, and magnitude.

Bill Machrone

She's also learned to read enough of its prompts so that she can select and play the games without adult intervention.

She tries her hand at straight recreational games, such as *Styx* and *Jumpman*, but the eye-hand skills required still elude her. Her current favorite is *My ABCs* by Adam Osborne's new company, Paperback Software. This disk is a veritable cornucopia of games, drills, and fun for kids. She likes the game based on "Concentration" best.

Stephanie also gets a tremendous kick out of using the mouse in conjunction with *PC Paint*. She sketches on the screen, draws and fills shapes, uses fonts, and generally has a ball. I walked into the den a few weeks ago to see what she had created on the screen. It looked for all the world like a Joan Miró dog.

"That's nice, Steph. Can you tell me about it?"

"It's a dog, Daddy."

"What was it going to be before you started?"

"A dog."

"You knew you were going to draw a dog?"

"Silly Daddy. Woof!"

Silly Daddy, indeed. But I'll tell you something sillier: the DOS user interface lies between us and all the learning, fun, and productivity the computer has to offer. You know just how bad it is when you explain all its little necessities to a credulous, malleable 3-year-old, and she hits you with the biggest gun in her arsenal: "Why?"

Training versus Teaching

Supposedly, teaching children is vastly different from training adults (note the difference in terminology), and confusing one with the other insults both. And yet a common ground exists between training and teaching that utterly dominates and overwhelms the professional jealousies that would have us believe that there is a difference, if not an impassable chasm: Learning. Adults learn. Children learn. Of course, you use different techniques to facilitate learning in the two groups, but when the subject is computers, the similarities are notable. Repetition and reward, for example, function identically. Granted, the rewards are dif-

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The extra money might be going toward flashier advertising, snazzier packaging or simply higher profits

But the extra money in a higher price isn't buying better quality

All of the good manufacturers put out a good diskette Period

How to cut diskette prices ...without cutting quality.

Now this discovery posed a dilemma how to cut the price of diskettes without lowering the quality

There are about 85 companies claiming to be "diskette" manufacturers

Trouble is, most of them aren't manufacturers

Rather they are fabricators or marketers, taking other company's components, possibly doing one or more steps of the processing themselves and pasting their labels on the finished product

The new Eastman Kodak diskettes for example, are one of these So are IBM 5¼" diskettes Same for OYSAN, Polaroid and many, many other familiar diskette brand names Each of these diskettes is manufactured in whole or in part by another company!

So, we decided to act just like the big guys That's how we would cut diskette prices without lowering the quality

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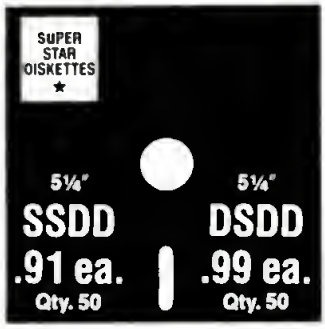
Name brand diskettes that offered high quality at low prices



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Instead, they concentrate their efforts on turning out the highest quality diskettes they can because they sell them to the software publishers, computer manufacturers and other folks who (in turn) put their name on them and sell them for much higher prices to you!

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ferent. A child responds better to a unicorn dancing to a merry tune, but both respond equally to on-screen words of praise once the child can read. Both have limited attention spans; motivation is the big factor in overcoming this limit.

Interestingly, children are often more motivated than adults to learn to use a computer or a specific program. It's all a matter of image. Children have many role models, from futuristic television shows to admired adults. They learn specific programs for self-satisfaction as well as peer-group acceptance. Sure, my daughter is more interested in computers when I'm around. She exults, however, in demonstrating her proficiency to other children, as well as adults. The computer is just as important an accomplishment to her as writing her name, pouring her own orange juice, or doing a somersault.

A Stacked Deck

Adults in business have the deck somewhat stacked against them. They may not necessarily want the computer, and they have significantly more experience at failure. They can imagine themselves failing to learn an aspect of computer operation and construct elaborate defenses in the event that they do fail. Children, in their innocent, enormous egotism, cannot conceive of failing to learn something new, especially when it's so much fun.

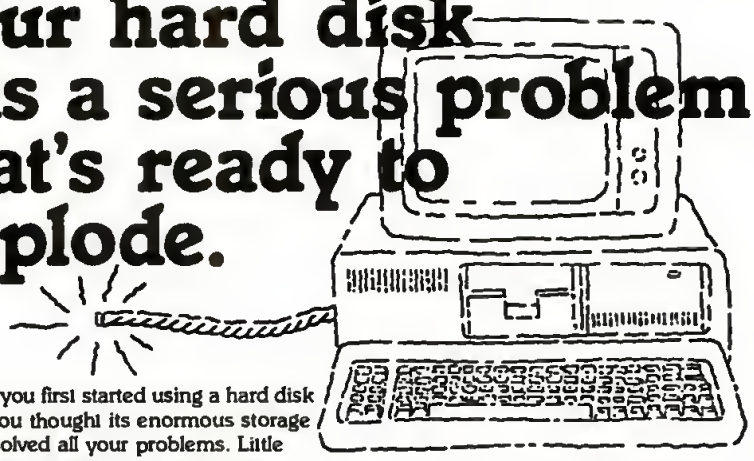
Not that the industry is making it easy for children or adults. No two of Stephanie's progams start from DOS in exactly the same way. All are copy protected. None select options the same way. Some use cursor keys, while others use the space bar or require specific letters to be pressed. The child's "Why?" lays waste to all this nonsense, while adults accept, rather resignedly, that it must be this way for some good reason and that it's going to be tougher to learn as a result. After all, they've been on the receiving end of systems designed by others all their lives. Indeed, most adults have about as much curiosity concerning why a program is designed a certain way as an Airdale does of how dog food gets into cans.

Should those of us who design programs for the use of others capitalize on human nature? Should we abuse the privilege? Obviously not.

Reasonable alternatives already exist. Topview, GEM, and (soon) Windows offer the programmer opportunities to standardize the user interface.

In the meantime, if you can turn on the Compaq's RGB port from a batch file, let me know how. Stephanie would be ever so grateful. ■

Your hard disk has a serious problem that's ready to explode.



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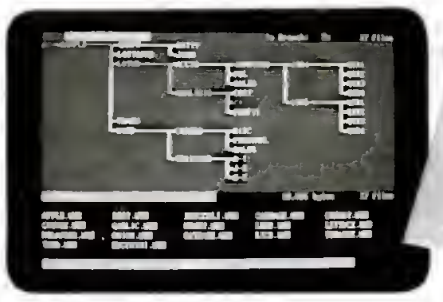

Requirements: IBM®PC XT, AT, or COMPAQ® and other true compatibles with 192K under PC-DOS 2.0 or higher. With 30MB or 40MB hard disk, you need 256K.

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CIRCLE 216 ON READER SERVICE CARD

Letters to PC

Driving Differences

Winn Rosch's review of half height floppy disk drives confused me ("Double Your Driving Pleasure," *PC*, Volume 4 Number 10). I use a QUME Qumetrak 142A and a pair of Shugart SA-455's, and none of the drives are exactly as he describes.

In the case of the Panasonic Shugart, the disk inserts and releases exactly as he says the CDC 9428 does. If he considers this feature worth mentioning for the CDC, and I think it is, then he should have also mentioned it for the Panasonic.

On the other hand, my QUME, albeit an earlier model, differs significantly from Rosch's description. It has no head interlock, so that you are perfectly free to crash the heads into each other if there is no disk in the drive. Rosch says the head-positioning motor is "buzzy but not unusually so." With mine, each track change makes a clunk that can be heard across the room. Indexing produces a grinding noise that makes me believe it is about to fly apart any second. It has given me good service, but the noise has scared me many times.

Both models arrived without any manuals, mounting instructions, or warranty information. The Shugarts came with a mounting kit but had no instructions for it, and the kit only mounted one drive on top of the other. I was completely on my own when it came time to fasten them into my PC. They are great drives, but they are murder to install.

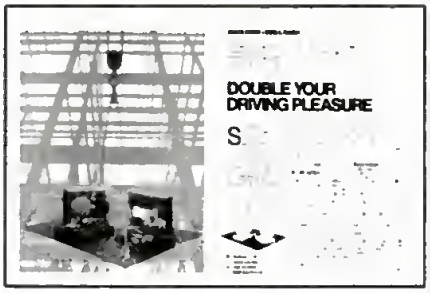
I wonder if the CDC and TEAC drives are as poorly documented as the Panasonic and QUME drives. This information would have been helpful in Rosch's review.

Mike Donehoo
Marietta, Georgia

Winn Rosch replies:

My product descriptions are accurate for the disk drives I actually received and tested. PC bought them on the retail market at the time I wrote the story. Manufacturers can, and often do, make alterations to products, either to fix flaws or reduce costs.

In the sidebar that accompanied the article, I tried to warn readers of the difficulties they might encounter in buying



raw drives. Although you are apt to get nothing more than the drive itself when you buy a floppy drive at a rock-bottom price from a wholesaler or OEM supplier, reputable retail dealers offer mounting kits and installation instructions.

Thoughts on Backups

I'm not sure if Winn Rosch has enough respect for Murphy's Law to be trusted with a computer, much less with writing an article about file backup. His article "A Pair of Winchesters Beats One Streaming Tape" in PC News (*PC*, Volume 4 Number 10, page 69) was very convincing in many respects, but I am simply too firm a believer in Murphy's Law to accept it entirely.

The gaping hole in the logic of his article is that he fails to acknowledge that whatever can kill one hard disk can also kill two. Besides, the possibility of a major disaster, such as a fire, destroying the entire PC along with all the important files on both hard drives, there is also the risk of the backup drive failing while the other one is out for repair.

The article briefly mentions that "tape does have several advantages . . . ." Tapes are removable and transportable." Yet, the fact that "you can keep several backup copies on separate tapes" is not nearly as important as the fact that you can keep several copies in several places. Of course, using "a little creativity," I can buy three hard disk drives and put them on a three-day rotation, keeping one in a location away from my computer. However, this sounds like a backup system that may break down in a hurry.

Also, I was surprised to find that Rosch wrote the article "An Up-Front Approach to Backup" that states, "High on the list of abominations blamed on IBM is the marketing of personal computers with 10- and 20-megabyte hard disks without an adequate means of backup." IBM probably expects everyone to do what Rosch suggests—buy two of everything (two ATs, two XTs, and so on). Then you simply put a serial port in each machine, cable them together, and presto, fairly fast backup.

Ethan Lanz
Lafayette, Indiana

Winn Rosch replies:

The biggest problem with backup systems is that the hardware is not used. A backup system that is more likely to be used (one that's faster or easier) is often the better one.

The point of my column was not to say that double disks are the best backup system for everyone but rather to show an alternative backup idea to computer users—and perhaps jar closed-minded or backward users into rethinking and reevaluating traditional backup technologies and strategies.

Incidentally, Murphy's Law is not really a law of Nature as Lanz believes but a joke written by an inventive soul to get a few laughs. Accepting it as truth means, in essence, that you did not prepare as thoroughly as you might have.

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graphics software issue ("Business Graphics: Giving Power to Presentations," *PC*, Volume 4 Number 12). The review was straightforward and right on target. I would like to clarify one minor technical point: In the section on sources of data input, *GrafTalk* was listed as ac-

cepting data only from the keyboard. *GrafTalk* also accepts data files created in any ASCII format, including such popular programs as *WordStar*, *1-2-3*, *dBASE III*, and its own built-in editor.

Jill Rago
Redding Group, Inc.
Ridgefield, Connecticut

UNDEL with DOS 3.*x*

I recently downloaded Steve Holzner's UNDEL program from the *PC Magazine* PC-IRS bulletin board ("Recovering Lost Files," *PC*, Volume 4 Number 7). Although the program will undelete a file with DOS 2.*x*, I was unable to make the /A option work. I tried entering the command and the /A in different combinations, for example UNDEL/A file, UNDEL /A file or UNDEL file /A, but to no avail. I would appreciate it if you would please explain what I am doing wrong.

Also, will the program work with DOS 3.0? I thought the FAT structure had been changed. I tried using UNDEL with DOS 3.0 and it seemed to work, with the exception of the problem with the /A option.

I especially like the Programming column in *PC*, and the new Interactive Reader Service makes programming even more convenient. I suspect that *PC* gets substantial feedback on this column, so how about publishing some of the user suggestions and modifications as well as follow-up comments and corrections. Also, would it be possible for you to

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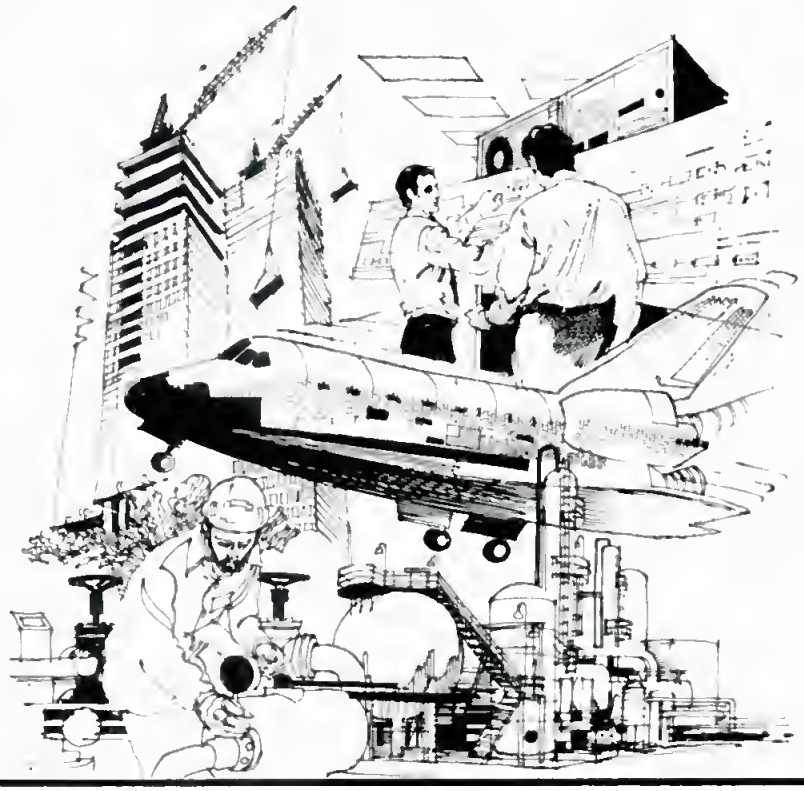

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CIRCLE 187 ON READER SERVICE CARD

LETTERS TO PC

make your programs compatible with DOS 2.*x* and DOS 3.*x*?

Drew A. Copeland
Agoura, California

Steve Holzner replies:
If you test UNDEL on a file with 1024 bytes or less (taking up one cluster on the disk), UNDEL knows exactly where that cluster is and doesn't print it out for confirmation. If you use longer files under the DOS 2.x, the /A option certainly should work (and I use it all the time). UNDEL also works with DOS 3.x as long as you are using standard, low-density disks. DOS 3.x uses a different FAT only for the new high-density (1.2-megabyte) disks and hard disks. DOS 3.x also reads switches differently, so the one thing that won't work is (you guessed it) the /A option.

I'm all for follow-up comments and modifications on programming columns and would like to hear from readers.

A Vacationing BBS

I am very pleased that my BBS, The Pigsty, made it to your recent list of bulletin board systems ("Across the Boards," *PC*, Volume 4 Number 12). Unfortunately, your article probably reached the newsstands and user's mailboxes just before I went on vacation and shut the bulletin board down. But now my vacation is over, and the bulletin board is up and running again, 24 hours a day.

The *PC Magazine* PC-IRS is a valuable service. Are you sure you won't reconsider copyrighting everything in your download area? To me, copyrighting defeats the whole purpose of a BBS.

Richard Marlowe
Winter Park, Florida

The program listings on PC-IRS are copyrighted simply because they appeared in PC Magazine. *Not protecting our copyright would undermine our rights and those of our authors. PC-IRS is free of charge, which is more than you can say for some other magazines' offerings.—Ed.*

Spinal Reference

As I gazed blankly at a stack of *PC Magazines* that I use as a footrest in my of-

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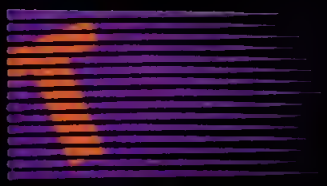

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CIRCLE 268 ON READER SERVICE CARD

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LETTERS TO PC

fice, I noticed the new designation for the magazine's spine is a short name for that issue's cover package. This is a good idea, which reminds me that there is always room for a more meaningful filing system. But does it mean that as a *PC* subscriber, I get free updates for the spines of my back issues?

Jim Anderson
Wayne, Pennsylvania

Black-and-White Screen Dumps

Thank you for mentioning our *Print Screen* software package in PC News ("Picks and Pans on Disk Deals," *PC*, Volume 4 Number 11, page 60). *Print Screen* does print in black and white, but it does not, in its current version, print in color. Instead, it prints color graphics screens using various gray patterns to represent each color.

Since your review, we have tested *Print Screen* on several dot matrix printers, all with excellent results.

Gilles Mousseau
Domus Software, Ltd.
Ottawa, Ontario, Canada

Correction:

In the BASIC listing for Steven Holzner's "Watching for Disk Errors," (*PC*, Volume 4 Number 12), line 90 on page 273 should read

```
90 FOR  N = 1 TO 194
```

With this correction, the resulting command file (313 bytes) will no longer result in a divide overflow error or a hung computer. Our apologies. There are no problems with the DSKWATCH.ASM listing, and you can download all files from our PC-IRS bulletin board at (212) 696-0360.

How to Write to PC

Do you have a comment, compliment, or criticism about something you've read in *PC*? A question you'd like to open up to other readers? Send it to Letters to PC, *PC Magazine*, One Park Avenue, New York, NY 10016. We are not able to answer letters personally.

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Unlimiled custom fonl fibrery	YES	NO	NO	YES
Alternate ohereoter sets on menu				
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Supporte pathnamee				
Configuration, fonl and print tiles	YES	YES	NO	NO
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Elite, compressed, enhenced, etc	YES	YES	NO	YES
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-n/180 (LQ-1500)	YES	YES(8)	NO	NO
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Set unidirectional prinfing	YES	NO	NO	YES
Set half-speed & proportional printing	YES	NO	NO	YES
Select 9 Epson fenguage sets	YES	NO	NO	YES
Letter quelity graphics printing				
Oouble density graphics	YES	NO	NO	NO
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RAM printer buffer up to 32K				
Butter on/off control	YES	NO	NO	NO
Print current buffer confrof	YES	NO	NO	NO
Abort current buffer control	YES	NO	NO	NO
Commend line printer setup control				
Aufoexec. bat file operetion	YES	YES	NO	NO
Unlimifed stored settings recall	YES	YES	NO	NO
Unlimited menu setting store & recell				
Single-key reset to delault settings	YES	YES	NO	YES
Configuration file settings storege	YES	YES	NO	NO
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Menu selection ot 6 font eizes	YES	YES	YES	NO(6)
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Sideweye font design	YES	YES	NO	YES
One-piece "glued" spreadsheet output	YES	YES	YES	NO
Charecter & line spacing control	YES	YES	YES	NO
Left margin control	YES(10)	YES(10)	YES	NO
Top & bottom margin confrof	YES	YES	YES	NO
Paper width choice/8" or 15"	YES	YES	YES	NO
Printer selection from menu	YES	YES	NO(1)	NO(1)
Menu printer port selection	YES	YES	YES	NO
Commands independent of Lotus version	YES	YES	NO(2)	YES
Spreedsheet pege setting constent	YES	YES	NO(3)	NO(11)
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Typewriter outpuf mode	YES	YES	NO	YES(9)
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NOTES Comparisons of Printer Boss & Sideline V5 0 01Apr85, Sideways V2 01 purchased 02Apr85 (1)Requires exit to installation program (2)Requires different procedures for Lotus versions 1, 1A and 1A* (3)Requires booting Sideways first to check possible number ot lines per page for formetted files (4)Not always, user must calculate gluelines number as suitable multiple ot page length tor unformatted tiles (5)Printer Boss end Sideline require only filename end number of rows in spreadsheet (6)Font size selecteble on downloadeble printers only by print mode selection (7)Not provided as menu choice but partially ee font file choice (8)Available only on some printers (9)Typewriter mode only (10)Via printer setup string (11)Does not provide horizontal segmentation "glueing" TRADEMARKS Sideways is a trademark of Funk Software Inc Epson is e trademark of Epson Corporation

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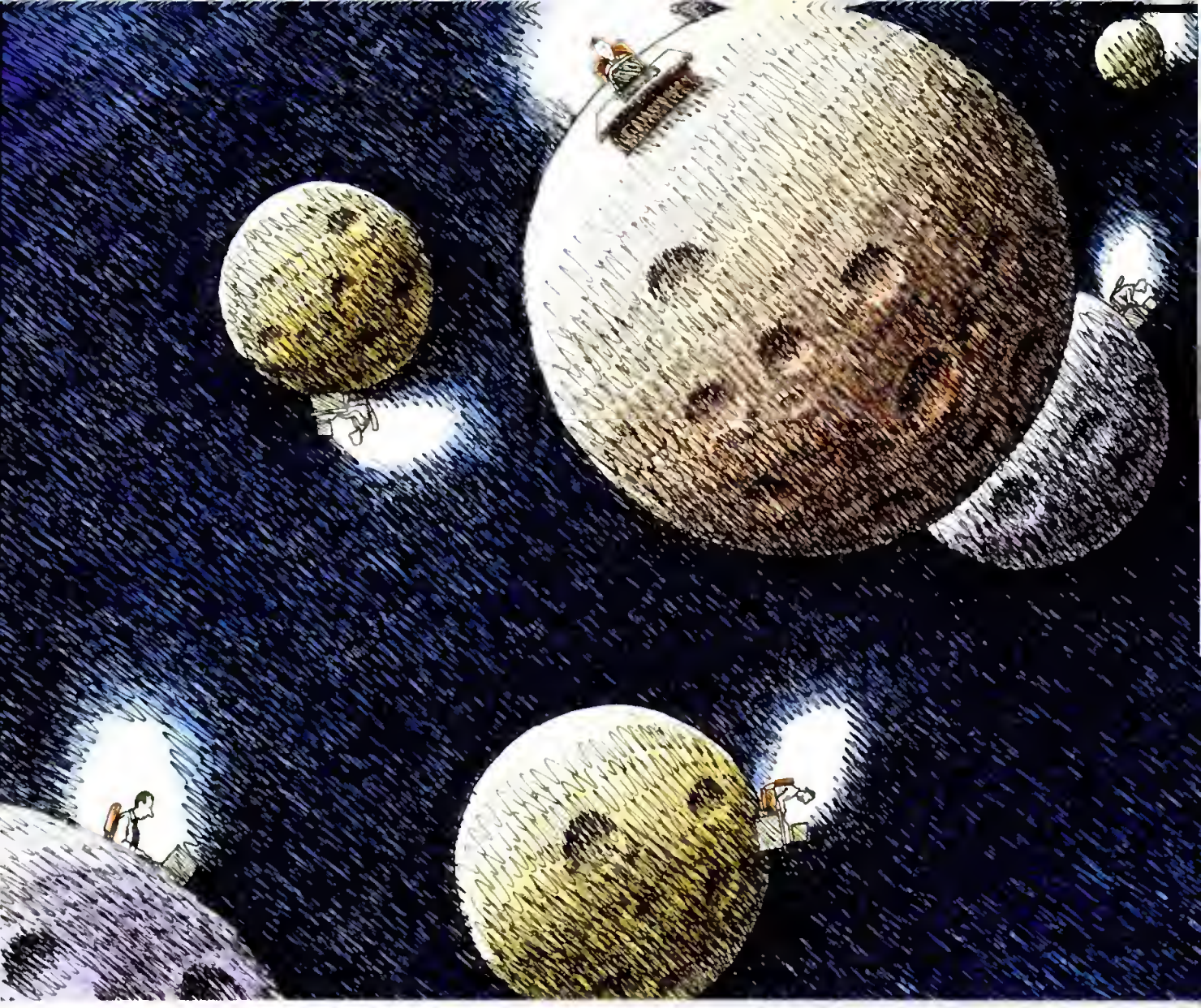
CIRCLE 175 ON READER SERVICE CARD



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Striving for Practical Perfection

Everybody wants to have the perfect PC system, but nobody wants to pay for it. In the first of two articles, Norton shows you that in some cases being penny-wise can be foolish.

Although all of us would love to have Ye Perfekt PC Systeme that is ideal for our needs, not many can realistically contemplate getting one because practical constraints, like money, usually stand in the way. But, when you think about it, more and more of us use PCs heavily in our professions, and it makes good sense to have the best working tools possible. It's quite easy to pinch pennies on your PC set-ups, but if you're talking about tools that you use heavily in your jobs, your penny pinching can turn out to be a pound-foolish solution.

I'm not talking about a gold-plated PC. I'm just not interested in a spare-no-expense, ultimate computer (see "The Ultimate PC," *PC* Volume 2 Number 2). I want to discuss how to construct the best possible PC as a working tool, without throwing money away.

It's amazing, when you stop to think about it, how often you cheat yourself by getting less than you really need in the name of ill-thought-out economy. I pound away on a PC more than full-time, and there are things that I've needed for my working systems that I haven't gotten, just out of pure cheapness.

So I started upgrading my systems. In this column and the next, I want to tell you the conclusions that I've reached about putting together a super system. I'll discuss hardware in this column and go on to software in the next issue.

What's in the Box

Obviously, you start with the box itself. Which PC model? The obvious choice is an IBM AT; but to my mind, a clear alternative is the new Compaq Deskpro 286. If you have a bias for Blue, then go AT. But for reasons that you'll see in a moment, the Deskpro 286 is a better move.

The first thing to do with an AT is to put a faster crystal in it, supercharging it up to a ⅓ faster speed, unless you want to use the 287 math coprocessor (apparently the 287 doesn't get along well with a faster crystal in the AT). The Deskpro 286 features the faster crystal installed, which you can turn on or off at will.

Peter Norton

Next, you should load up your machine with a reasonable amount of memory and I/O ports using AST's Advantage! board or Tecmar's Maestro board; avoid using IBM's memory boards (see *PC*, Volume 4 Number 7, p. 105). For the moment, forget about loading up your AT or Deskpro 286 with extended memory or bank-switched memory; just take it up to 640K. But with the AST and Tecmar boards, you can move up to extended memory when you need it.

Get a 32-megabyte hard disk and forget about a second floppy drive or a second hard disk.

Then, for God's sake, get a tape backup unit—The Maynard Maynstream, the Tecmar tape unit, or the tape unit that's built into the Deskpro 286 (the Compaq is looking better every minute).

Taping It Seriously

Not enough PC users take tape backups seriously, but you should. Backing up a hard disk onto floppies is such a nuisance that almost no one does it as often as necessary. This procrastination is an invitation to disaster, as many of us can painfully testify. Another downfall of disk backup is that DOS's BACKUP and RESTORE programs have some awful bugs in them. I discovered the bugs in DOS 2.1 the one time I had to restore something. Unless you have hours to tend to your machine while backing up, or you really like patching the disk in hex, you should treat yourself to a tape backup unit.

If you use a PC for your work, you're crazy not to have a tape backup unit in place; end of lecture.

All that was the easy part. Now for some less-obvious stuff.

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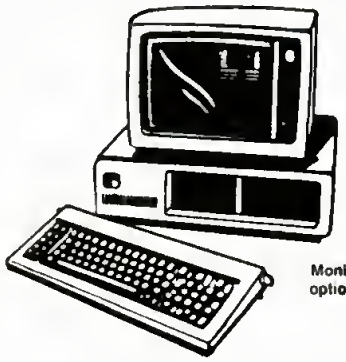
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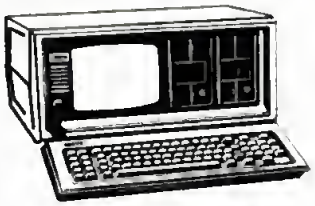

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CIRCLE 242 ON READER SERVICE CARD

combined with the most widely supported graphics capability. If you've really got to have color, get an IBM Enhanced Graphics Adapter without the extra memory and an IBM Enhanced Color Display. However, my feeling is that grown-ups don't need color pictures.

The key step is to put a quarter-polarized glare filter on your screen. Don't, for heaven's sake, do without a glare filter, and don't get one of those cheapies. We're talking about saving your eyesight, so get the best; they're under a hundred bucks.

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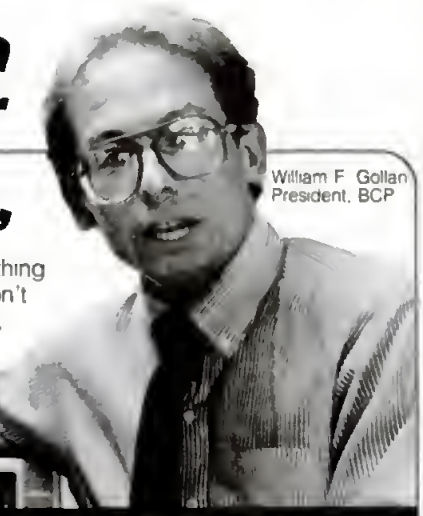

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The most-important things you can get in a printer are true letter quality and true quiet.

Slower Is Better

I suppose 2400-baud modems are the latest hot thing, so you might as well get one. Then you can wait a few years for your communications service to support 2400 baud and wait a few decades more for the quality of the phone lines to catch up. On the other hand, 1200 baud might make more sense. In either case, get a Hayes, and get an internal modem to avoid cluttering up your desk with more equipment.

Choosing a printer is always a tough decision, but to my mind, you have two clear choices. The most-important things you can get in a printer are true letter quality and true quiet. (If you aren't making your whole system not only as easy on the eyes as possible, but as easy on the ears as possible, you're more of a masochist than you think you are.)

The two printers to consider are the IBM Quietwriter and the Hewlett-Packard Laserjet. The IBM printer is more versatile in the ordinary sense—it handles tractor-fed forms, and so forth. The H-P Laserjet gives you even better letter quality and a wider choice of type sizes and fonts. For good reason, H-P has been running ads with the headline "Set Your Laser on Stun"—the Laserjet printer is truly stunning, if somewhat pricey. Don't consider any other laser printer, though. There may be better ones, but the H-P is the most practical and the most widely supported.

Although I began this essay by saying that I didn't want a "gold-plated" PC, there's one piece of gold-plating that I would love to have, and that's the very pricey and very impressive Apple laser printer. If you want the ultimate in computer printers, the Apple laser will deliver it to you. But judging from some correspondence I've received lately that was printed on the Hewlett-Packard Laserjet, the H-P is super enough for most.

Laying out the cash for a laser printer—about $2,500 for the H-P if you can get a good discount—may be out of the question for personal PCs, but it is fairly reasonable for business use. If your business is paying for any kind of typesetting, chances are good that you could do it yourselves, in-house, with a PC and a laser printer. In pure dollars saved, the Laserjet may well pay for itself; when you consider the time saved, the ability to do last-minute in-house typesetting, and so forth, a laser printer might become an essential expense.

> The MicroManager System makes your PC look more professional; soon it'll be in all the stores.

Keeping It Under Cover

Accessories are a somewhat dull but important part of your PC hardware that deserves more mention. MicroComputer Accessories Inc. is king of the heap in making these little goodies for the PC, including dust covers, rolltop diskette files, and the tilt-and-swivel platform that I mentioned before. Its latest product, The MicroManager System, is my favorite. It's a modular set of stacking stands that can hold a PC, a printer, paper, and more. It doesn't sound very exciting, but, in fact, it's a very tidy solution to a messy problem: where to put the PC and how to stash the tangle of cables (they tuck neatly inside these modules). The modular construction, the attractive design, the excellent way it stows cables, and the caster wheels on the bottom make it a darned good way to get your PC off your desk. In too many offices, PC-clutter is making the place look like a boiler room. The MicroManager System makes your PC look more professional. For now, you'll find it in some mail-order computer supply catalogs, but soon it'll be in all the stores. If you don't want to be a PC-slob, you'll get one.

In the next issue, I'll face the messier question of software for Ye Perfekt Systeme. ■

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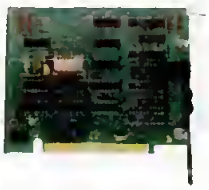

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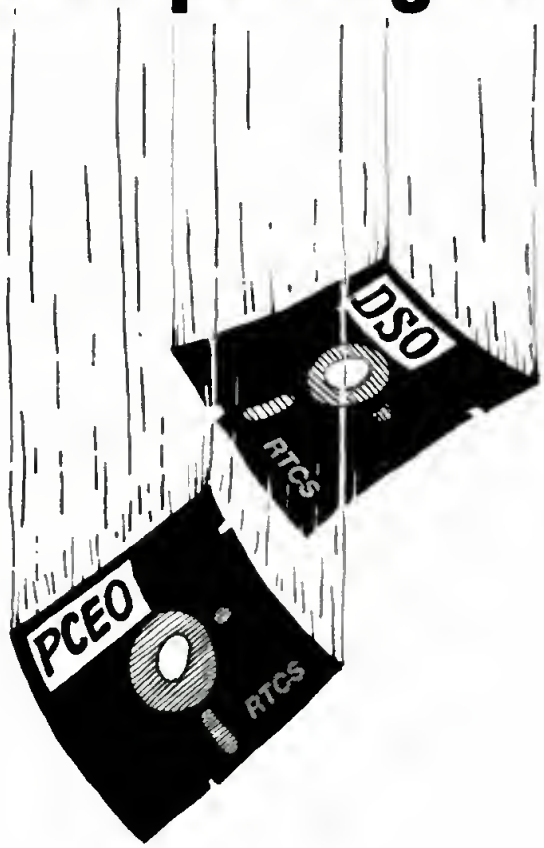

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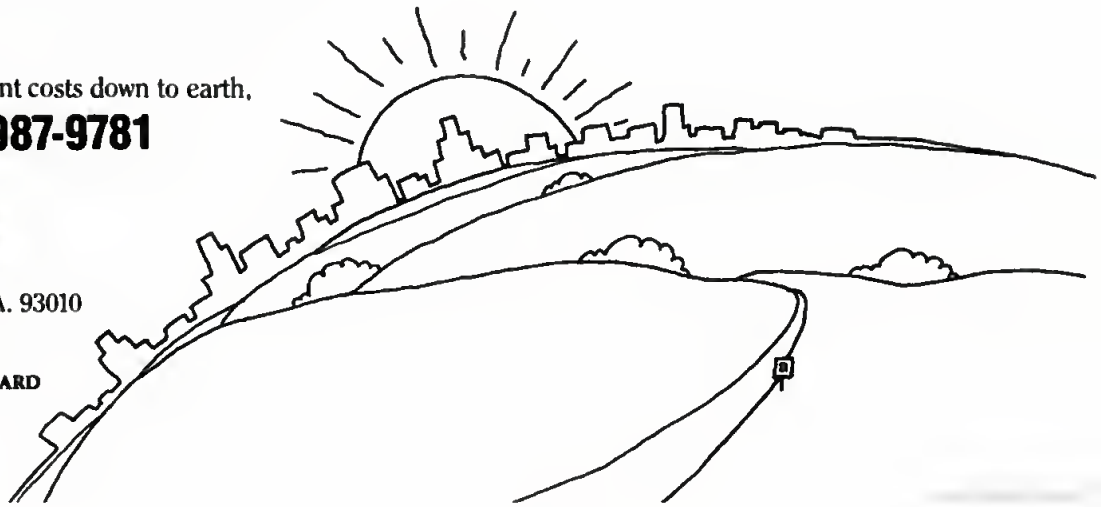

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UNSUNG HERO

COVER STORY | BILL MACHRONE

IN PRAISE OF UNSUNG HEROES

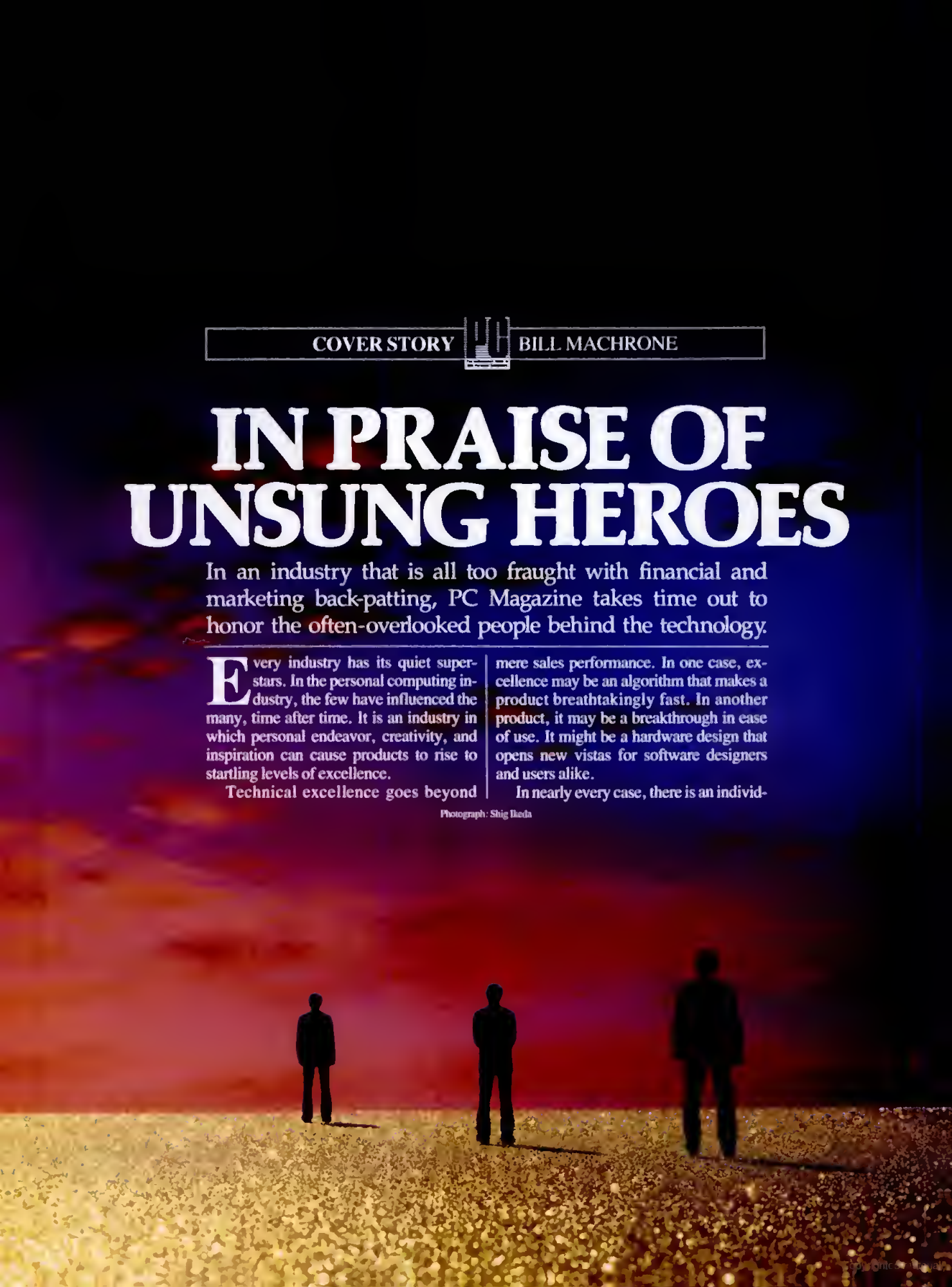
In an industry that is all too fraught with financial and marketing back-patting, PC Magazine takes time out to honor the often-overlooked people behind the technology.

Every industry has its quiet superstars. In the personal computing industry, the few have influenced the many, time after time. It is an industry in which personal endeavor, creativity, and inspiration can cause products to rise to startling levels of excellence.

Technical excellence goes beyond mere sales performance. In one case, excellence may be an algorithm that makes a product breathtakingly fast. In another product, it may be a breakthrough in ease of use. It might be a hardware design that opens new vistas for software designers and users alike.

In nearly every case, there is an individ-

Photograph: Shig Ikeda



ual or a small team at the heart of an outstanding product; a person who makes sacrifices for a vision. These are the unsung heroes, the creators of technical excellence. Their accomplishments, however, are often lost in the marketing hype and consumers' devotion to the best-seller lists.

PC Magazine's editors decided the time had come to recognize these unsung heroes and the excellence embodied in their work. Deciding who would receive the awards was difficult yet straightforward. We assembled an editorial board, then gathered nominations for the products

The majestic grounds of Atlanta's Swan House were the perfect setting for the presentation of the awards.

Photographs: Robert Phillips

THE HOTTEST TICKET IN TOWN

PC Society Editor Paul Somerson filed this report from the field—and what a field it was.

Prizes in the micro business generally don't mean much; they're usually dispensed by swaggering computer moguls to the same few vendors year after year purely as a tribute to clawing out a high-altitude perch on someone's best-seller list. While occasional winning products are of first-water quality, the process often ends up spotlighting fat marketing budgets rather than technical prowess.

Most awards are just frail brass plates stuck to veneered boards, handed out in stuffy auditoriums between stultifying, self-serving speeches that drone on too long. And the suspense is rarely killing. Will Mitch Kapor himself be there to receive the prize—or will it be picked up by one of his lieutenants? People in the audience don't exactly chew their nails down to nubs while waiting to find out.

PC Magazine wanted to do things right. We felt the people who genuinely deserved recognition were the folks in the back rooms who sweated around the clock for years in front of their computers so you wouldn't have to in front of yours—the real unsung heroes of the trade. And we wanted to hand them a work of art rather than a framed piece of paper or a plywood plaque.

After an extensive search, editor Bill Machrone commissioned an old-world craftsman to create and produce six massive solid silver medals. Painstakingly hand-carved, hand-cast, and hand-finished, these dense, jewel-like cartwheels elicit appreciative sighs and soft whistles whenever they are slipped out of their plush velvet bags.

Rather than present the medallions in a dusty hall, *PC Magazine* arranged for a truly appropriate setting: a gracious Southern manse called Swan House, set on 22 acres of lush Atlanta woodland. Dominating a hilltop with sweeping panoramic vistas of pin oak, Georgia pine, and purple bougainvillea, Swan House—modeled after a sixteenth-century Italian villa—is the embodiment of classic elegance and urbanity.

The estate's original owner, son of an immensely prosperous cotton broker, had inherited a bundle that he and his wife spent picking up eclectic furnishings and pricey antiques—from a clay T'ang dynasty horse, to a Dutch tall case clock that clangs out seven different hymns, to a Venetian table whose base is a cringing carved blackamoor with gilded feral eyes. A central swooping lacework staircase slices down to stately Ionic columns and a

that had made the most significant technical contributions to the industry in 1984. We refined our judgments, and consulted with industry experts. Here are the winners and the products they created.

Robert Carr: Framework

Framework is one man's idea of how integrated software should work. Fortunately, many people agree with Rob Carr's conception. From the time we first saw the prototype FRED, to the press unveiling in New York, to its triumph in *PC Magazine*'s Spreadsheet Face-off, *Framework* has been a winner. Its combination of speed, innovative user interface, and flexi-

Master of ceremonies Bill Machrone.

The view from the podium.

The winners pose with their awards.

burnished marble floor. Exquisite porcelain vases and precious objets d'art crowd every flat surface.

Behind the house a series of sumptuously landscaped terraces and fountains cascades into the vanishing point; inspired by the gardens of the Palazzo Corsini in Rome, this majestic verdure was the perfect backdrop for a festive evening of conviviality and bonhomie under the stars. Although more than a dozen social events had been scheduled by other COMDEX exhibitors the same night, it was evident to all that the cream of the computer industry was present in the dusky, perfumed garden.

While top computer brass rubbed elbows with the many merchandizing celebrities, legendary technical wizards, and financial luminaries in attendance, the flower of the international computer elite sipped champagne and nibbled on delicate canapes of caviar, buttery Gulf shrimp, and Pernod-scented escargot. Nearby jazz musicians provided a haunting counterpoint in the soft crepuscular light. *PC Magazine* editors and advertising executives in white tie kept the conversation flowing smartly; other elegantly coiffed staffers in sequined formal gowns and filmy chiffon evening dresses provided a full measure of southern hospitality and charm.

The actual presentation was warm and uniformly well-received. Bill Machrone stole the show with colorful introductions he had rehearsed several nights before while waiting for his wife to give birth to their new son. The air was thick with electricity as the first recipients mounted the staircase to accept their medals. At the foot of the steps the audience seemed gratified by the selection and the tenor of the ceremony; its applause was generous and heartfelt. Some of the winners simply grinned ear-to-ear as they hefted the gleaming silver trophy. Others offered eloquent thanks to valued colleagues and their hosts. Borland's Philippe Kahn toasted Pascal inventor Nikolas Wirth. Jim Slager, codeveloper with Eugene Hill of Intel's highly praised 80286 CPU, puckishly opened his coat and unfurled a blueprint of the next generation 80386 chip. Jeff Garbers, creator of Microstuf's *Infoscope*, peered down from the lofty balcony and quipped, "I feel as though I should be announcing the overthrow of a government." Both Robert Carr, chief architect of *Framework*, and *Enable*'s Robert Hamilton were characteristically modest. This was the second time *PC Magazine* had recognized Carr; earlier in the year *Framework* took top honors in *PC*'s Spreadsheet Face-off.

After Bill handed the final award to personal computer pioneer Henry Kee, the winners and guests strolled across the broad manicured lawn to waiting tables crowded with silver hampers of smoked baby Georgia quail, shimmering whole poached salmon, truffles, fragrant flaky tarts, and other local specialties. Wining, dining, and serene camaraderie continued late into the night.—**Paul Somerson**

bility has set an almost insurmountable standard for integrated software. While the marketers would have us believe that FRED stands for "Freely extensible RECursive Development language," Carr says that it just stands for "FRame EDitor." Such elegant understatement is the mark of the man and his product.

Philippe Kahn: Turbo Pascal

Turbo Pascal has singlehandedly turned Pascal into the language of the future. Some say that it has even rescued Pascal from oblivion. Everyone recognizes the sheer innovation, speed, size, and efficiency of Turbo Pascal, which has become a model for compiler designers everywhere; hundreds of thousands of users eagerly await the next round of Turbo products. In a market where slow-running products have become the norm, developer Philippe Kahn has restored pride in tight code to the PC programmer.

Bill Machrone, editor-in-chief of *PC*, and Jeff Weiner, publisher (in center), chat with some of the award recipients.

Eugene Hill and Jim Slager: The Intel 80286

The 80286 is arguably Intel's first processor that is not directly descended from the early calculator chips. It breaks through hardware and software barriers and has created a new standard in personal computing. Despite its long and sometimes difficult gestation period, the 80286 is a clear winner, as evidenced by the number of new products that use it. While the migration path it lights from the 8088 is a key factor in its success, its expanded instruction set, speed, and addressing capabilities have been refreshing for both operating system designers and application developers. It exemplifies the continued growth and vitality of our industry. Turning ideas into silicon is one of the most arduous tasks humanity has yet invented for itself, but bringing forth a product like the 80286 is its own reward—especially for Eugene Hill, project leader, and Jim Slager, logic design manager for the chip.

Jeff Garbers: Infoscope

People look at *Infoscope*'s user interface and say, "Gee, I wish I'd thought of that." But the slickest user interface doesn't buy you much if the program doesn't perform. With *Infoscope*, Jeff Garbers has set a standard for combining performance with ease of use. *Infoscope* doesn't represent artificial intelligence, but it shows real intelligence in letting users decide how to format their data and how to manipulate it. It exemplifies Garbers's devotion to doing things right.

Robert Hamilton: Enable

When *Enable* was first demonstrated at *PC Magazine*, we yawned. "JAIP," we said (Just Another Integrated Package). Okay, the spreadsheet was powerful. And yes, the graphics were sharp, and the word processor wasn't bad. Then the demonstrators took a graph and merged it into a text file. Not bad. But when they edited it, that was too much. "You can't *do* that," we said. "*Enable* can," they replied. And that's the real story behind *Enable*: its creator, Bob Hamilton, was determined not to create a me-too product. His is a restless intellect, one that refuses to take no for an answer, one that continually seeks new challenges.

Henry Kee: PC Blue Series

All of our award recipients are driven, committed to their ideas and ideals. But we have singled out Henry Kee as the man most committed to the *idea* of personal computing. He has imposed order on the chaotic world of public-domain software, in the form of over 100 disks in the PC Blue series. Henry has cataloged and organized each of them. PC Blue disks are well distributed through user groups and mail-order channels. They work synergistically with commercial products, addressing markets that are too small to warrant commercial support. Kee's packages allow users to try a genre of software for little or no cost, then trade up to commercial products when their needs require more than the abilities of user-supported software.

The Presentation

PC Magazine presented these awards during Spring COMDEX in Atlanta. The smaller of the two annual COMDEX shows, the spring event is still an important gathering of the clan, a time when the industry gets together to see the new products and offer its wares. At an awards dinner held at Atlanta's Swan House mansion, we presented each winner with a specially designed medallion cast in sterling silver. In a world already crowded with plaques, prizes, and tacky bowling trophies, we wanted to create an award that conveyed the depth of our respect for the creativity and sheer craftsmanship of our recipients. Each medallion is a handmade, personal creation, as unique as the talents of its recipient. We found it especially fitting that our silversmith is also a programmer whose favorite form of expression is assembly language.

These awards are actually long overdue. The best-selling packages receive awards. The entrepreneurs receive adulation. The marketers are lauded in the trade journals. In some cases, our winners are also the entrepreneurs who take the big risks. Other unsung heroes are simply employees of their companies. The key here is that it doesn't matter. *PC Magazine* has presented these first annual awards for technical excellence to individuals whose efforts are unarguably among the most important for 1984. They have advanced the state of the art. They have changed the direction of the industry. They are worthy of our praise. ■

Photograph: Robert Phillips

Profiles In Technical Excellence

Their names aren't household words, but their achievements put them far above the crowd. Let us help you get to know the people whose products shape our present and future.

"It was the classic 7-day work week that you get with fervent believers."

Robert Carr/*Framework* (Ashton-Tate)

When he first conceived the idea for *Framework*, Robert Carr was working as programming consultant on a different product—an integrated spreadsheet package called *Context MBA*.

"I was convinced," Carr says, "that integration was a powerful idea that brought many benefits with it. But I also thought that integrating around a single large spreadsheet constricted the user. A more appropriate method would allow the user to break information into many smaller chunks that could be linked together logically." This, according to Carr, is the heart of *Framework:* it permits you to break up your data into separate frames in any order you like. "Based on that conviction, I thought, What the hell, why don't I try programming it? So I started programming it on my PC, hoping I could prove the idea workable, implement it, and start a company to market it."

Carr, 28, had done a stint at Xerox's Palo Alto Research Center, where he worked on predecessors of Xerox's Star and *Smalltalk*. He holds B.S. and M.S. degrees in computer science from Stanford University.

In January, 1983, after a year of designing, Carr began to create a program to embody his idea (which he called FRED for "Frame Editor") and by June it was clear that the programming effort was even more successful than he had hoped. "I was beginning to talk to some companies when Marty Mazner, who has more marketing background than I have, came by, saw FRED, and asked "Do you know what you have?" We got to talking and decided to cofound Forefront."

Their goal was not to organize a software company that would superintend the product through its appearance on the store counters, but to start a development corporation that could finish the product and team up with a leading publisher. "In July, 1983 we decided to go to Ashton-Tate first," Carr remembers. "We got a terrific reception. Within 2 days we concluded an agreement stating that they would both act as venture capitalists and get marketing rights to *Framework* and would also get rights to buy Forefront in 1986." In fact, the product was so successful that Ashton-Tate recently announced an agreement to buy out Forefront sooner.

So, beginning in September 1983, Carr and company spent a feverish 10 months laboring to finish *Framework* ("It was the classic 7-day work week that you get with fervent believers," Carr says) and were able to finish the work in a relatively short period of time.

"*Framework* is certainly not a result of my efforts alone," Carr insists. "Six other individuals worked with me day and night for almost a year. It's very much a result of their good ideas and excellent work. They and all of the teams need to be recognized by the software industry. Few products have been the result of one individual's effort."

Since then, *Framework* has established itself as a major product in the integrated software market. "Integrated is a very loose term," says Carr. "An incredibly wide-ranging bunch of products fits under it. People who buy *Framework* find that it's easy to learn and use. Most software packages demand about 50 hours of training. But although you have to make a learning

investment the first time you come to *Framework*, that training applies to all the different functions. If in the next week or month, you want to pick up say, the word processing function, you'll find that it works very much like the spreadsheet." Carr foresees an important role for integrated software in the move toward widespread use of local area networks. "The whole industry is moving from personal to group productivity tools," he asserts. You can expect to find Carr and *Framework* riding on the crest of that wave.

Photograph: Mark Snyder

"Technical people with no venture capital were able to build a company that is now number 5 in the software industry."

Phillipe Kahn/*Turbo Pascal (Borland Intl)*

"It was a gamble," says Phillipe Kahn. Sometimes a gamble pays off; in Kahn's case, it resulted in the top-selling language compiler Turbo Pascal (see Power User, this issue) and a new company, Borland International, that has quickly made a name for itself in the highly competitive software market.

Kahn, who received the French equivalent of a Ph.D. in mathematics from the French Academy of Sciences, taught mathematics at the university level in Nice and Grenoble before coming to the United States. He became enamored of the principles and potential of Pascal when he studied under Niklaus Wirth, author of the language. So when Kahn arrived in California 3 years ago, he got together with two close associates and surveyed the software market.

"We saw that the only uncluttered market that was available at that time was in languages. Everybody was trying to do spreadsheets and word processors and databases. But nobody was paying attention to languages, so the quality of available languages was very low." They decided to produce a Pascal environment for the IBM PC. "We wanted the product to run in less than 64K RAM. That was extremely important. It's easy to run compilers in 256K, but we wanted a low-memory interactive system with a powerful editor that people could use on machines with a single floppy disk and save the rest of their memory for other things. It also had to be fast in compilation and execution." He smiles. "Nobody believed it."

In fact, venture capitalists were so skeptical that Kahn and his colleagues decided to do it totally on their own. In November 1983 they tossed Turbo Pascal into the marketplace.

"At that time," he recalls, "there were four people working at the company. We didn't even have an advertising person—I put together the first ad for Turbo Pascal at midnight with a girl who knew how to do pasteups. Later, we hired an advertising guy, but he left us because we decided to go back to our basics. Doing it ourselves was better."

Since its introduction, Turbo Pascal has become the best-selling version of Pascal and the fastest Pascal language compiler. It is making Pascal the most popular language at the academic level: More than 450 universities use it worldwide, and it has sold over 300,000 copies. Borland International has grown in 2 years from two rooms over an automotive repair shop to a company that employs more than 100 people.

"It's really a case where people who are not marketing or advertising experts—who are, in fact, technical people with very little management experience and no venture capital—were able to build a company that is now number 5 in the software industry," he says proudly.

Kahn is the author of several books, a big fan of science fiction and gourmet Chinese food, an avid sailor, and an accomplished jazz saxophone player. He is 33 years old and lives with his wife, Martine, and his two daughters in Aptos, California.

Although Borland has produced an entire family of language development tools since launching its first product, Kahn takes particular pride in Turbo Pascal. "Turbo exemplifies our philosophy of bringing only high-performance software with a technological edge into the market at a reasonable price," Kahn asserts. "Turbo is Borland's first contribution of real software tools to personal computer users."

"We've been able to do a few things that our professors had told us were not practical to do in a computer."

Jim Slager and Eugene Hill/*Intel 80286*

Most microcomputer experts will agree that one of the most important hardware developments in recent years has been the Intel 80286 processor. Jim Slager, who, together with Eugene Hill, contributed considerably to the chip's development, is very much aware of its importance. "So far, it seems to be the most successful chip that Intel ever made," he says. "It may turn out to be the most successful chip that anyone's ever made."

Slager, the logic design manager for the 80286 microprocessor, has been with Intel for 7 years. Previously, he worked on the first MOS computers at Bunker Ramo Corporation and with the PPS4 and PPS8 microprocessors at Rockwell International. He received his B.S.E.E. from the

Left, Jim Slager; right, Eugene Hill.

University of Illinois, where he also worked on the Iliac 4 project. Slager lives with his wife and daughter in San Jose, California.

"I think the most important thing about the 80286 chip is that it came out at the right time to exploit the PC market," Slager continues, "although that's not what we thought about back in 1979 when we designed it. But the chip was there when the PC market was still growing, and it fit right into it."

Hill, a design manager for Intel, was the project leader for the 80286 chip during the 6-month period devoted to samples. He oversaw the chip's design, layout, and architecture.

"Several factors contribute to the chip's importance," Hill asserts. "It's the first time I've seen a fairly complex microarchitecture actually implemented on silicon, where several logical units are all operating simultaneously. I think that's an important trend. There are many classical approaches to building very fast machines, and I think we're on the verge of implementing a lot of those in silicon.

"I think that previously, technology hadn't really allowed for a system to be put on silicon. However, by doing that, we've achieved quite a performance gain, and we've been able to do a few things that our professors had told us were not practical to do in a computer. I think in the future, a lot of integration and functions that were traditionally found in CPUs will go on boards."

Hill has worked at Intel for 9 years and is currently working as the project leader for the 80386 chip. He chaired the definition group for the Intel 8051 while managing its microcontroller group. Prior to working for Intel, Hill worked at Collins Rockwell and American Microsystems, designing everything from telephone equipment to the first digital television sets. By the time he was 30 years old, he had designed 30 chips. He received a B.S. from Oregon State University in 1969 and did graduate work at the University of California's Irvine and Santa Clara campuses, and at Long Beach State. He lives in Cupertino, California with his wife and two children.

"It may turn out to be the most successful chip that anyone's ever made."

"It's not unlike childrearing. Some days you feel awful, and some days you're sure it's the best baby that's ever been born."

Jeff Garbers/*Infoscope (Microstuf)*

"Well, it's one of those things you have to see to appreciate," grins *Infoscope* creator Jeff Garbers. "It's a highly interactive visualization system that lets you get out and twiddle with your data. When we first developed *Infoscope*, we batted around a lot of names. One of our favorites was 'Electronic Platypus.' "

Whatever its name, the program that Garbers describes as an "electronic recordbook or dynamic information system" has turned out to be quite successful. *Infoscope* has developed into a very popular database product that is simple and flexible.

The 25-year-old Garbers, a program designer at Microstuf, Inc., has been important in developing software that adapts itself to the user's needs, interests, and vocabulary. Like many of today's software whiz kids, he started young—at age 11. "I saw some of my Dad's IBM manuals, got interested in them, and taught myself COBOL," he recalls. As a senior in high school, he took a data processing course that gave him access to a computer once a week. He went on to Wabash College in Indiana, where he majored in math and worked part-time in the

computer center. In January, 1979, he bought an Apple II and began to learn things for himself.

Garbers then entered Georgia Tech, where he was introduced to the theories of human factors through a course taught by Dr. Albert Badre. Instead of focusing on a system's potential ability, Garbers learned to visualize products from the user's standpoint.

"I was teaching a class in Pascal," he explains. "I had about 60 students and I had to keep track of their names, social security numbers, majors, grades, and stuff. I didn't have my PC yet, and had to put the information into *VisiCalc;* I could do computer averages, but if I wanted to know whether science majors were doing better than nonscience majors, for example, *VisiCalc* didn't let me answer such questions. I thought about getting a database system, but it wasn't worth hours of my time to go through those menus. I wanted something more spontaneous."

After completing his M.S., Garbers left Tech and formed a company whose name made his philosophy clear—Userview Corporation. He began work on a versatile data management program that was to become *Infoscope*.

"It wasn't a trivial undertaking," Garbers admits. "It took 2 years to write. My unique form of fanaticism is that I still sort of do things the old-fashioned way: in assembly language." He smiles. "It makes my C friends roll their eyes. I decided that assembly language was best in order to make the program quick and responsive. I wanted the fastest sort on the planet. And if I write code, I want it talking directly to the processor.

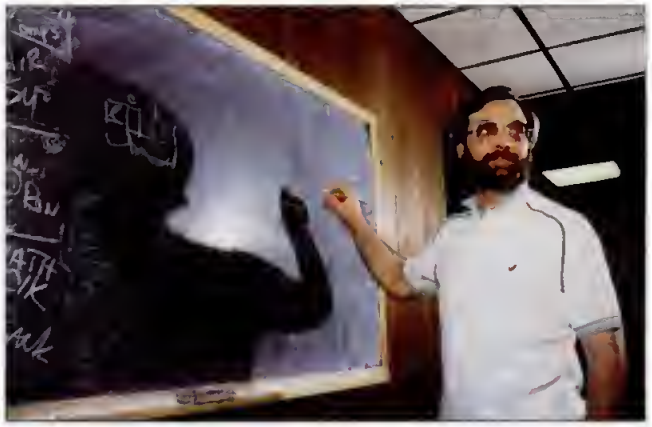
"A lot of things just happened along the way. Many times I felt like I was running into a brick wall; I'd sit around for a while and finally figure out a way to dig a hole underneath and get through that way. It's not unlike childrearing. Some days you feel awful, and some days you're sure it's the best baby that's ever been born."

In late 1982, Garber turned the organizational problems of Userview over to Microstuf, a company whose outlook matched his own. He and Microstuf president Les Freed "both saw that the computer business was moving toward users who didn't have the interest or the patience to figure out obscure programs. Someone had to create programs that cooperated with this very large group of computer newcomers."

"There is a definite parallel between Enable's structure and that of a human organization."

Robert Hamilton/*Enable* (The Software Group)

"There is a definite parallel between *Enable*'s structure and that of a human organization," says Bob Hamilton, creator of *Enable*. "The master control module, which we affectionately call the corporate staff, maintains common services for each of



the applications, which we refer to as the divisions. It also has a president responsible for controlling the environment, a receptionist, a public relations manager responsible for releases, and a small army of clerks. *Enable*'s speed, efficiency, and consistency is a consequence of that internal structure."

Hamilton is the vice president of software development for the Software Group. He characterizes *Enable*'s creation as "the challenge of developing a set of productivity tools that combine the power of mainframe systems, the functionality of special-purpose standalone products, and the ease of use, speed, and affordability of micro software."

Hamilton came to the Software Group after two years at Thyssen-Bornemisza, where he served as the multinational Information Technology Group's vice president of new product development. As vice president of systems development for Bibliographic Retrieval Services, Inc. (BRS) from 1976 to 1980, Hamilton was responsible for the design and management of such technical projects as modifying CICS internals and IBM/STAIRS (which reduced CPU use and storage requirements), and developing a multiuser full-text retrieval software package for large IBM mainframes.

Before he went to BRS, Hamilton served as the director of bureau of identification of the New York State Division of Criminal Justice Services and the director of admissions for the State University of New York, where he developed an on-line CICS-like system in an OS/370 environment. Hamilton has a B.S. and M.S. degree in aerospace engineering from the State University of New York in Buffalo. He has been married for 23 years, has four children, and resides in Clifton Park, New York.

While at BRS, he began developing the concept that would eventually become *Enable*. "The impetus came from looking at the marketplace," Hamilton said, "and deciding that improvements could be made." He and colleague Ron Quake began looking at the possibility of creating a multiuser business system with groups of tightly integrated applications such as word processing, database management, spreadsheets, and so on. "We felt that it wouldn't be too much longer before the hardware necessary to support that environment would be commonplace. In that environment, you'd need a software design that would support multiple users right up front, not added on as an afterthought. *Enable* came from looking at where the

hardware was going. Since we had some experience with other software, we moved toward what we felt would be a complete set of horizontal products."

As the developer of *Enable*, Hamilton is certainly not resting on his laurels. Future versions will have a sophisticated menu generator and a standard interface with high-level languages meant to give program developers full access to all of the applications within *Enable*.

"This interface will really provide a greater set of tools, a better starting point," Hamilton says. "Furthermore, it means that all of the files will have compatible data structures. It will be very easy to move data from one application to another."

The tremendous success of *Enable*, Hamilton added, has had a great deal to do with the extensive background of the applications teams that have done work on the project. "Each member has about 12 to 13 years of experience with systems programming in a mainframe environment. So we will certainly continue to expand and improve."

"In today's market there is no longer any outlet for selling your own software."

Henry Kee/*PC Blue Series*

"In today's market there is no longer any outlet for selling your own software," explains Henry Kee. "The public domain offers a forum for the cottage industry software author to put his or her wares on display."

Kee, a vice president in information services at Chemical Bank in New York, has played a major role in keeping that outlet vital. He started the PC Blue series in the early part of 1982 as an extension of the already existing SIG/M Users Group Library of Public Domain Software for CP/M personal computers. The system he set up enables PC users to receive and copy a large variety of author-contributed programs.

PC Blue is certainly not Kee's only accomplishment. He is a regular panelist on WBAI Radio's "The Personal Computer Show" in New York and a member and director of both the Amateur Computer Group of New Jersey and the New York Amateur Computer Club. In addition, he is the systems operator for the New York group's bulletin board. The founder of the PC Blue User Group Library of Public Domain Software for IBM PCs is also the cofounder, former editor, and librarian of the SIG/M Users Group Library of Public Domain Software for CP/M personal computers.

Before joining Chemical Bank, Kee worked for Blythe, Eastman, and Dillon Company; Honeywell; and Chase Manhattan Bank. He has a B.A. in mathematics and science from Wagner College in Staten Island. Kee is married and is currently residing in Flushing, New York.

As you might guess, the PC Blue series is not a highly profitable venture. But then, it's not meant to be. "Unlike some libraries, we're not out to make money," says Kee. "We make the programs available through distribution outlets such as computer clubs. We now have up to 30 clubs receiving the library, and we encourage them to make copies for their members. They charge their members a $1 fee and use the money to fund the club activities. For those who are not in any clubs, the New York Amateur Computer Club provides the programs to users when supplied with media, postage, and handling." He smiles. "It's worked out pretty well. We have a high level of acceptance, and, as a matter of fact, a lot of authors now submit material to us directly."

Kee, whose work has not gone unrecognized in the microcomputer industry, is proud of the special nature of his award from *PC Magazine*. "Five of the six awards were for creativity. Mine had to do not with creativity but with public service and a lot of hard work. I've gotten a lot of awards, but this one I cherish."

According to Kee, the authors who contribute programs to the PC Blue series can be divided into three different groups: altruists

who simply want to share their software with the world, glory seekers who want to show others how clever they are, and serious programmers who are looking for a distribution outlet for their products.

"People are collectors," Kee asserts. "They want to build up a software library of their own."

PC Blue gives the programmer a chance to say "Here's a copy of my program; if you like it, you can send me money, but you don't have to"; or, alternatively, "Here's a 90 percent working copy of my program; if you like it, give me money and I'll send you the full version."

Only one thing bothers Kee these days: the exploitation of PC Blue. "People are starting to advertise the rental of libraries, and I can't stop it. In a sense, I'm doing the work, and they're taking the money."

By collecting and distributing programs that might otherwise have gone unnoticed in the microcomputer industry, Kee has helped keep that industry vital and exciting. ■

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FOCUS ON PC TRAINING

SHAPING THE LEARNING CURVE

Most users need some training to learn a new program, no matter how "intuitive" the interface. But effective training involves more than just a one-day seminar or one-hour tutorial. The training solutions portrayed in the following articles will help you target your needs, design a well-focused, workable plan, and spend your training dollars and hours wisely.

User friendly has become a phrase that invites snickers. Software just isn't friendly. Neither is it intuitive—a word that has shown signs of replacing user friendly. The term "intuitive software" implies that a user can sit before a PC and understand how to manipulate the software on sight. Even assuming that an interface can be called instinctive, the amount of human behavior driven by instincts is debatable. I submit that while we may have a survival instinct, we do not have a software instinct.

Learning is simplified when you are able to relate it to past experiences—for instance, waterskiing is easier to learn if you already feel comfortable in the water. The only thing even remotely "intuitive" about learning to use a PC lies in its loose resemblance to televisions, typewriters, and dinner menus. Knowing how to adjust a television screen, press keys, and order filet mignon in a restaurant is, however, a long way from understanding the intricacies of magnetic and electronic media, software interfaces, and machine intelligence. Since software interfaces are so different and so alien to the average adult's experience, "intuitive software" is little more than a marketing slogan for now.

Photograph: Dennis Kitchen

OBSTACLES TO LEARNING

Three factors make PCs more difficult to use than other electronic equipment such as microwave ovens and cars: a large number of features, the lack of a common language, and infrequency of use.

Popular word processors typically contain over 100 features, of which about three quarters are needed for general use. This number is likely to increase because the popular vote (counted in terms of sales dollars) has judged that more features are better. Complex software packages sell

Three factors make PCs harder to use than other electronic equipment: the number of features, the lack of a common language, and infrequency of use.

better than simpler ones—witness the popularity of the multifeatured *MultiMate*; of *1-2-3*, which adds many features over earlier electronic spreadsheets; and the recently released *Symphony* and *Framework*. Clearly, users want enough features to meet a range of needs, even if having it all involves maneuvering around features they don't want.

The keyboard is another rather messy communications tool because it, too, has a large number of unstandardized features. Recently, software manufacturers have tended to swallow their pride and suppress their individuality to make summoning help easier: most now use F1 or an F1 key combination. Some named keys like PgUp, Ins, and Esc also have fairly predictable results. But that is about as close as anyone has come to a common keyboard language: the rest—more than 100 keys and key combinations—is up for grabs.

The keys on the keyboard form a sym-

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bolic language. But because the symbols are so generic and their meanings vary so much from package to package, users often resort to color-coded prompt cards, self-adhesive key tops, and keyboard templates to keep track. In other words, they must add another set of symbols to help them interpret the symbols already on the keyboard.

SPEAKING IN TONGUES

Adding to the difficulty of learning a large number of software features are language inconsistencies among competing software packages, among products in the same software line, and sometimes even within a single product. Fortunately, the situation is improving as software developers recognize the need for interface standardization. Over the years, language will pose less of a problem. At first a barrier to learning, computer jargon is weaving its way into everyday conversation, as in "Let me get out of this loop!" "What's this column of cells?" and "My boss erased that incident from his long-term memory."

Some terms are slowly becoming standard. Commands like INSERT, PRINT, QUIT, and EXIT result in the same action whatever software is used. When there isn't an accepted, standard term for a particular function, the best the manufacturer can do is choose a common word that most closely suggests that function. Words like *setting*, *line marker*, and *shadow*—whose meanings are still a bit fuzzy—reflect this practice.

Standardized language and features will benefit both the novice and experienced PC user by making it easier to move across software packages. It would also drastically reduce the need for training.

Unfortunately, without some impetus, significant standardization will not occur for a long time. The PC software industry is still too young and too creative for common features and user interfaces to emerge though a gradual evolution is likely. In the meantime, training can bridge the gaps created by a lack of standardization.

Frequent use is the third element that contributes to ease of learning. Although language and number of features are under the manufacturer's control, regular use is not. The manager who calculates budget figures with *Symphony* once a month will have more trouble than the person who uses the package every day. Most *WordStar* old-timers are so familiar with the key combinations that they could play *WordStar* trivia over a beer after work. Meanwhile, back at the office, sporadic users have trouble even when a menu is staring them in the face.

Unfortunately, without some impetus, significant standardization will not occur for a long time. The PC software industry is still too young and too creative for common user interfaces to emerge, although a gradual evolution is likely. In the meantime, training can bridge the gaps created by a lack of standardization.

Familiarity presents another dilemma, however. Once a particular set of software commands has been ingrained in memory, trying to erase it can cause problems. For example, users switching database packages will pray that the familiar commands won't cause irreparable harm if they accidentally (and inevitably) enter them when using the new package.

USING POWER EFFECTIVELY

These obstacles to learning mean that for the foreseeable future, anyone who wants to use the power of a PC needs some sort of training. The form of training may vary as will the amount, but mastering the use of any software package requires a learning aid.

According to a study by the International Data Corporation, a research firm, 61 percent of the companies that use PCs provide training. An annual census taken by *Training* magazine places that figure at 57.8 percent. Both sources indicated that training in large companies tends to be more formal than in small companies.

The training activities vary also. A major West Coast corporation whose employees are mostly engineers doesn't provide PC training on the grounds that engineers don't need it. For them, training consists of reading the documentation. Since software manufacturers are doing an increasingly better job of writing self-instructional materials, additional training may be unnecessary for engineers and others who have a technical background.

For most people, learning to use a software package is plain hard work; for others, it simply requires time and patience—something that most adults have in short supply. As you read the articles that follow, you'll see that a variety of training approaches have emerged to meet different learning styles and temperaments.

Since software still has a long way to go before it is truly easy to use, training will be needed to integrate PCs into the workplace.

Independent research firms predict continuing growth in the computer training business. As computing skills increase, the primary need for PC training will shift from basic literacy to more-sophisticated business applications. No matter how "intuitive" software becomes, the challenge of applying software tools to specific business problems won't go away. As long as software imposes a certain logic, users must learn to understand that logic. Even if computers achieve the free-form communication promised by science fiction, training will be needed to extend computer resources and help make them more responsive to specific business needs. ■

Kate Barnes is president of Barnes Associates Learning Systems, a developer of computer training programs based in Tucson, Arizona. She is a columnist for PC Week.

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INDIVIDUAL TRAINING:

A MATTER OF STYLE

The best way to teach yourself a software package and explore its idiosyncracies depends on you: the amount of money you can afford to spend, the time commitment you're willing to make, and the learning method that suits you best.

Disk tutorials, seminars, audios, videos, workbooks—anyone who has tried to learn the ins and outs of a software package using one of these common PC teaching aids knows that one person's solution is another one's problem. So once you're ready to start learning, the first step is deciding which method is right for you.

Experts agree that people learn differently and that their preferences vary when it comes to how they learn. Belinda Ulrich, an assistant vice president in charge of PC training for the U.S. Trust investment bank, feels that effective training depends on an individual's style. "Some need to do, and some need to watch; some like to press buttons, and some are afraid of pressing buttons. A good deal depends on the amount of previous exposure to computers."

Choosing among the various training methods often boils down to a question of time versus money. According to Doug Cobb, the dynamic trainer, publisher, and *Symphony* whiz behind The Cobb Group training firm, "The best training for an individual depends on that person's needs and resources. There's a tendency to look at training options as separate minitools. Actually they are part of a price/time continuum from low-cost, labor-intensive books to one-on-one consulting." Another often-overlooked factor to consider, says Cobb, is the user's experience. Experienced users have the advantage of being able to work alone; hence, they can use a book or other self-teaching method.

ALL IN THE PACKAGE

Can you find happiness and fulfillment without spending money on supplemental training? Most users and experts agree that manufacturers are paying more attention to providing adequate training materials with their software. Sorcim/IUS's well-reputed *SuperCalc3* contains a mind-boggling selection of instructional materials. Included in the package is a *Ten Minutes to SuperCalc* quick-start pamphlet, a context-sensitive help screen, a comprehensive reference manual, a print-based tutorial, a quick-reference answer card, and prebuilt spreadsheet files with a wide variety of examples. In addition, Sorcim maintains a

INDIVIDUAL TRAINING

Photograph: Dennis Kitchen

phone hotline and offers training seminars for dealers.

Sorcim marketing manager Jim Cansler estimates more than 25 percent of *SuperCalc*'s cost is related to support materials. "The training materials we provide cover a number of different levels," says Cansler, "but they involve a lengthy learning period. Those who need to gain proficiency quickly or those who are not familiar with personal computers typically look elsewhere."

"As packages grow more sophisticated and there are more things to be learned, the user will want to look to outside sources who have developed curricula and strategies for teaching the program," suggests Scott Brown, Ashton-Tate's technical public relations manager. Ashton-Tate, creator of *dBASE* and *Framework*, actively participates with third-party training developers and finds the relationship a symbiotic one. The company has also developed its own supplemental courseware including workbooks, reference books, and disk-based training.

Which training materials work best? The answer is as personal as the computer itself. Search your soul, and identify what it is you need to learn.

WHY NOT THE BEST?

Which training materials work best? The answer is as personal as the computer itself. Search your soul as well as your pocketbook, and identify what it is you need to learn. "Someone who says 'I want to learn how to use *1-2-3*' is often actually asking 'How do I use this machine?' " observes Russ Walters, author of *The Secret Guide to Computers*.

THE BOOK WORMS

If you enjoy reading and learning on your own, you're likely to turn to books to get the computer training you need. It's easier to skim through a reference book than a disk-based tutorial or cassette tape, and you can reuse a book without getting bored as you might with many other learning materials. A good software training book is full of examples that teach you how to apply as well as use the program. And the nicest thing about books is that they're cheap and plentiful.

Be cautioned, however: Learning to use complicated software from a book requires effort and academic gumption, and it can be difficult to work with a book and a computer screen simultaneously.

Training books come in many flavors: reference books, workbooks with examples, books aimed at power users or novices, and books with accompanying disks. Most are written by notables in the field. Some are charming and intimate, others more concise and efficient.

Russ Walters defines his concept of a computer learning book. "A book should

LAYING OUT THE TRAINING OPTIONS

	Manual	Book	Computer-Based Training	Audio	Video	Interactive Videodisc	Adult Education	Seminar	Consultant
Privacy	yes	yes	yes	yes	yes	yes	no	no	yes
Hands-on materials	usually	usually	yes	yes	sometimes	yes	some	sometimes	no
Previous experience required	usually	helpful	no	no	no	no	no	no	no
Cost*	included	low	low	low	high	varies	moderate–high	moderate–high	high
Avg. time to complete	on demand	3 days	2–5 hrs	1–2 hrs	1–2 hrs	1–2 hrs	30 hrs	2–3 days	8–16 hrs
Reusability	yes	yes	yes	yes	yes	yes	no	no	no
Individually paced	yes	yes	yes	no	no	yes	no	no	yes
Reading required	heavy	heavy	some	none	none	none	varies	some	none
Flexible scheduling	yes	yes	yes	yes	yes	yes	no	no	yes
Customized	no	no	no	no	no	no	no	sometimes	yes
Emphasis on how-to skills or applied knowledge	how-to	both	how-to	how-to	how-to	both	both	both	both

*low = under $100 moderate = $100–$200 high = over $200

Here are some points to compare when choosing a training method. How does the one you're considering rate?

be a reference, so you can look up information quickly. It should be a tutorial offering step-by-step examples. It's got to provide an organizational overview, and it should be a motivator. It should do these things very quickly, keeping examples as short as possible."

"To date, the book is by far the cheapest way to learn a skill," says Rodney Zaks, president of Sybex Publishing, a leading computer textbook publisher. "It involves one difficult aspect: reading. Because people need the skill, they will sometimes resentfully pick up a book to train themselves. If the book is good, they will continue."

If you're in a rush, however, a book is probably not the answer. Even the shortest, most captivating book may take more time to read than you have to spend. "If your boss puts a copy of *dBASE II* on your desk and says he wants a program by next week, a book won't help," says Walters. Nor are books a viable option for the casual user, according to Joel Rakow, president of ATI (American Training International), a national training firm. "If you use the software 10 or 15 percent of the time, you can't afford to spend a week learning it."

AUDIOPHILES

Those who are better listeners than readers will enjoy learning using audiocassettes. Initially I pooh-poohed the idea of using my antiquated cassette player as a teacher, but after taking a few courses I found that listening and doing complement each other well. Of course, flipping and rewinding tapes is much more tedious than paging through a book, but if the tape is well organized, the mechanics are minimal. Skipping past undesired lessons is a chore (a good counter on your tape machine is a must). But all things considered, tapes are an inexpensive, relaxing way to learn.

There's enormous variation in the quality of audio training on the market. There aren't too many large-scale manufacturers of audio training tapes. Home-brewed tapes tend to be low-tech, containing straight narrative.

The popular FlipTrack Learning Series permits optional branching, allowing you some choice in the learning process. "FlipTrack brings another medium into the picture," says Lee McFadden, president of FlipTrack and creator of the series. "It offers personalized instruction without the cost of a seminar or consultant. You can be involved with the keyboard and screen without having to avert your eyes to a book. The simulated environment of a disk-based tutorial is eliminated. There's nothing buffering reality." McFadden adds that you are free to make mistakes (and learn from them) with the FlipTrack series.

Another interesting play on the audio theme comes from User Training Software of Campbell, California. UTS's patented audiodigital technology lets your RS-232 port communicate with its playback unit. As you hear an explanation on the tape, you see it executed on the screen. By toggling the playback unit off, you can exit the tutorial and practice with the software on your own. While this technology is significantly more expensive than the traditional cassette tape (about $4,000 for a full course and hardware), you get to listen, watch, and do.

VIDEO LEARNING

"Someone who has a phobia about machines will do better looking at a video than a computer," says Gil Herman, senior product developer for Deltak, one of the largest producers of video and disk-based training materials. Videos are an effective tool for those who don't need to learn how to operate a package but want to understand the conceptual framework behind it.

Deltak and ASI (Advanced Systems, Inc.), as well as other national training firms, offer series of PC videos that tend to be elaborately staged productions and impart knowledge in a personal and entertaining way. These companies bank on a segment of learners that, as ASI's director of marketing Richard White puts it, "don't feel comfortable sitting in front of a computer" and "like to learn by watching."

Video training has some inherent problems. "Either you're not sitting at the terminal and practicing, so you're passively listening and watching, or you're busy fussing with the video rewind and pauses so you can work interactively with your computer," observes ATI's Joel Rakow. While you may be able to tolerate a disk-based tutorial or a book for a second round, the prospect of watching a video rerun is a gloomy one. Although the "real-life" scenarios often portrayed on training videos are frequently contrived and stereotyped, once they get to the meat of the course, they can offer a relaxing, exotic way to learn.

Good-quality videos are expensive, costing as much as $5,000 a minute to produce. When production costs go down, video may be a viable option for the individual user.

COMPUTER-BASED TRAINING

"For the person who can use the keyboard and load a program, the disk-based tutorial is superior to other forms of training," says Richard White of ASI. If you don't want to randomly muck around with your program and can't afford a seminar, then disks offer an affordable, sheltered learning environment. Typically, disk tutorials cover hard-core applications such as

If you enjoy reading and learning on your own, you're likely to turn to books to get the computer training you need. It's easier to skim through a book than a disk-based tutorial or cassette tape, and you can reuse a book without getting bored as you might with many other training materials.

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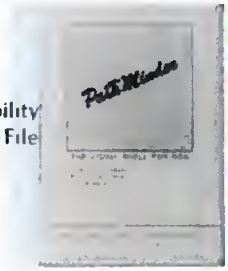

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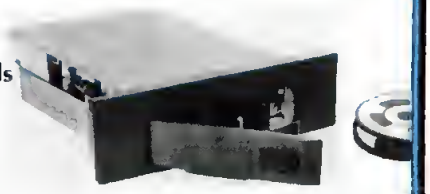

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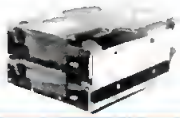

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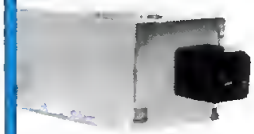

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DOS, *MultiMate*, *WordStar*, and *Framework*, and they tend to be good skill-builders for practicing program commands and keystrokes. Unfortunately, many of them fall short of the mark when it comes to applying the information that's learned. Many of the better disk-based tutorials from national training firms can be expensive, primarily because of high development costs, and the better material is available through corporate channels and not from the retail market.

The top tutorial programs are written with proprietary authoring systems so that the training software closely simulates the actual program, enabling you to try your hand at the real thing without running the risk of doing any damage. Most employ some form of split-screen technology so you can view the training on one half of the screen and the simulated software on another. ASI's Advanced Architecture Courses and Deltak's How to Build a Business Plan series are two new courses that attempt to infuse keyboarding and command skills while also challenging you to apply what you learn.

"Disk-based tutorials are pretty good on keyboarding stuff," says Les Squires, director of training and documentation for the Boston Computer Society. "They can check to see if you've spelled the word right, if you actually pressed a key, or if your syntax for a command was correct. But floppies are inherently limited. Until we get to the seventh generation of computing, they will never get beyond press this, press this." On the other hand, this feature makes disk-based tutorials ideal for learning the keyboard and skill-oriented applications. Programs such as QED's Typing Made Easy are interactive and fast-paced and impart knowledge in discrete, palatable modules.

Disk tutorials can be interactive, but they can't offer too many answers to your questions. Because they are difficult to "page" through, because they quickly become tedious, and because they are dumb (albeit patient), disk-based tutorials have a long way to go before they become the ultimate training solution.

A hands-on seminar is a wonderful hand-holding, phobia-reducing exercise for inexperienced users. But for people who know how to use a computer and want to familiarize themselves with a particular software package, the lecture, or "hands-off" seminar, may be the better solution.

SEMINARS

Traditionally, training seminars have been expensive and have therefore been confined to the domain of businesses who were able to afford to send their employees to them. "There's definitely a feeling among users that they want hand-held guidance—hence seminars," reports Joel Rakow, of ATI, which recently introduced a series of software training seminars.

Recently, computer stores and local training centers have made seminars an affordable reality for the individual user. At ComputerLand's Long Island stores, seminar prices range from $50 to $125 depending on the level of instruction—beginning, intermediate, and advanced. Alisa Metal, software and training support manager for the stores, believes vehemently in the hands-on seminar approach. "If you sit at a piano with a piano instructor, you learn the piano. We make it possible for people with any level of expertise to have nearly individualized instruction for affordable prices."

"Unlike books or tutorials, hands-on seminars don't have to anticipate people's needs," says Joe Sabrin, vice president of the PC Executive Training Center (PC ETC), a New York training firm. "If we know we're training bankers or lawyers, then we gear the application to them." Tom Vayda, senior training consultant at PC ETC, says, "A corporate person doesn't have the time to read a book or take a college class. While there's no way you'll get everything you need in a day-long, hands-on seminar, you get a heavy dose of knowledge that you can take back and assimilate in the comfort of your office."

A hands-on seminar is a wonderful hand-holding, phobia-reducing exercise for inexperienced users. It's also a good method for those who need to learn skill-based applications, such as word processing. But for people who know how to use a computer and want to familiarize themselves with a particular software package, the lecture, or "hands-off" seminar, may be a better solution.

"We want to impart maximum knowledge in 2 days," says Doug Cobb, describing his fast-paced *Symphony* training sessions. "You don't get maximum knowledge when you're sitting and typing at the keyboard."

"A lecture circuit has a much higher bandwidth; it's a more efficient way to learn large amounts of information. You

TAKING A CUE FROM THE FORTUNE 500

Lecture/lab	79%
Computer based	67%
Print based	29%
Video	25%
Audio	23%
Interactive video	17%

What do Fortune 500 companies do for employee computer training? This table shows what methods they choose, according to the Yankee Group, a Boston-based consulting firm.

can always look up the keystrokes," says Adam Green, one of the celebrities of the computer lecture format. "Learning about computers is like learning about a car," he continues. "If you didn't know what a car was and needed to learn how to drive, I'd put you in the driver's seat. But if you wanted to learn about touring Europe, why would I give you a car? I assume people already know how to drive and are looking for some interesting places to go."

Green and Cobb distribute plenty of take-home materials for users to complete when they are not running the meter on expensive teaching time. Both lecturers charge around $250 per day.

Finding a good training seminar is like playing Russian Roulette: You have no way of knowing the outcome until you give it a shot. The quality of instruction and the level of students' knowledge varies tremendously. Cynthia Harriman, director of the University of New Hampshire Summer Computer Institute and veteran seminar teacher reflects on the intensive format of many software workshops: "By noon your brain is like tapioca pudding." To provide an alternative, the Boston Computer Society and the University of New Hampshire have entered a joint venture to offer low-cost training in more relaxed, week-long sessions.

Some schools offer even longer adult education courses at a comparably low cost. At New York University, for instance, a noncredit, semester-long course in the $300 range combines 20 hours of hands-on training with reading and lectures.

But even the smallest class may not offer much individual attention. If you feel you need intensive one-on-one instruction, your only alternative is to hire a consultant—and pay a consultant's high fee. "Like the piano student," says Les Squires from the Boston Computer Society, "if you want to learn Chopin, you'd better hire a private teacher. Then you can't complain that the teacher taught you a different tune or a different instrument than the one you wanted."

CONSULTANTS: ONE ON ONE

"A personable, knowledgeable, and compassionate human," says Sybex Publishing's Rodney Zaks, "is the best computer trainer." If you could obtain a guarantee that every consultant you hire would be this saintly person, it might possibly be worth the $400 a day that you'd have to fork out for their services. Consultants, however, like seminars, are unpredictable. Even the good ones have bad days. Then there's always the consultant who knows *Framework* inside out but doesn't understand a thing about computerizing your business's inventory control or cash flow procedures.

Andy Bose, senior analyst at Link Resources, a research and marketing firm, imparted some friendly advice: Don't ignore the grass-roots phenomenon. Grass-roots consultants are usually found lurking at local user group meetings, haunting bulletin boards, or burning the midnight oil in front of the corporate PC. These enlightened human beings can sometimes shed a little light on your microcomputer problems, often free of charge, when all your other options have run out.

A NEW METHOD

One new form of training that seems to combine the advantages of several methods is the interactive videodisk.

Interactive videodisk training combines film scenarios, smooth fluid graphics, user interaction, voice, and simulation. Although this self-training method is not yet as affordable as disk-based training, it may soon be.

ASI now has some interactive video courses on the market. The company's demonstration disk required me to interact with the computer about once a minute; just pressing Enter wouldn't do. I watched film clips on a TV screen that showed people performing an operation. I imitated them and even did some creative thinking. I was tested, my scores were cataloged, and I popped around the lessons with a fair degree of personal choice. The videodisk demanded no rewinding or pausing. After awhile I even got it through my head that the purpose of this TV screen, unlike mine at home, was not to put me in some altered entertainment state.

ASI claims that interactive video offers an impressive degree of learning compression (comprehension/retention).

Though the cost of producing an interactive video is about the same as for regular video or disks, the hardware required to run it is still very expensive. But someday people may be able to link their home video players to their PCs and take in a few lessons from the "interactive tube."

SHORT CUT TO EASY STREET

No training method yet invented offers a panacea for learning. Different users will find some techniques too slow, some too intensive, and others just right. The best training probably involves a customized blend of materials and a motivated learner. "To become a computer expert you need three things," summarizes Russ Walters, "a computer to practice on, books to refer to, and people to ask questions of." All three resources are in plentiful supply—getting the training you need is just a matter of finding a winning combination. ■

Robin Raskin is a frequent contributor to several computer publications, including PC Magazine. *She has written instructional materials for a number of corporations.*

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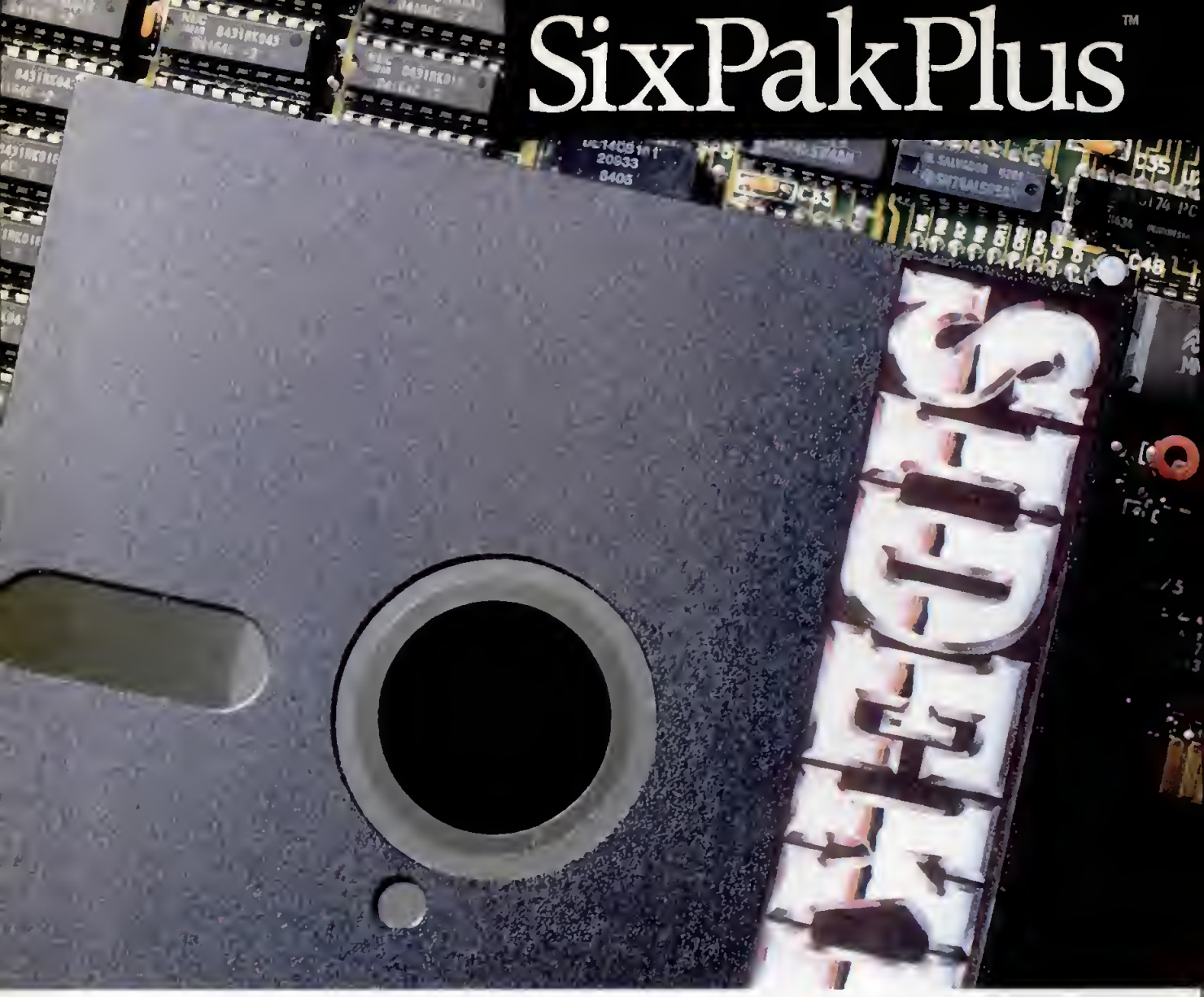

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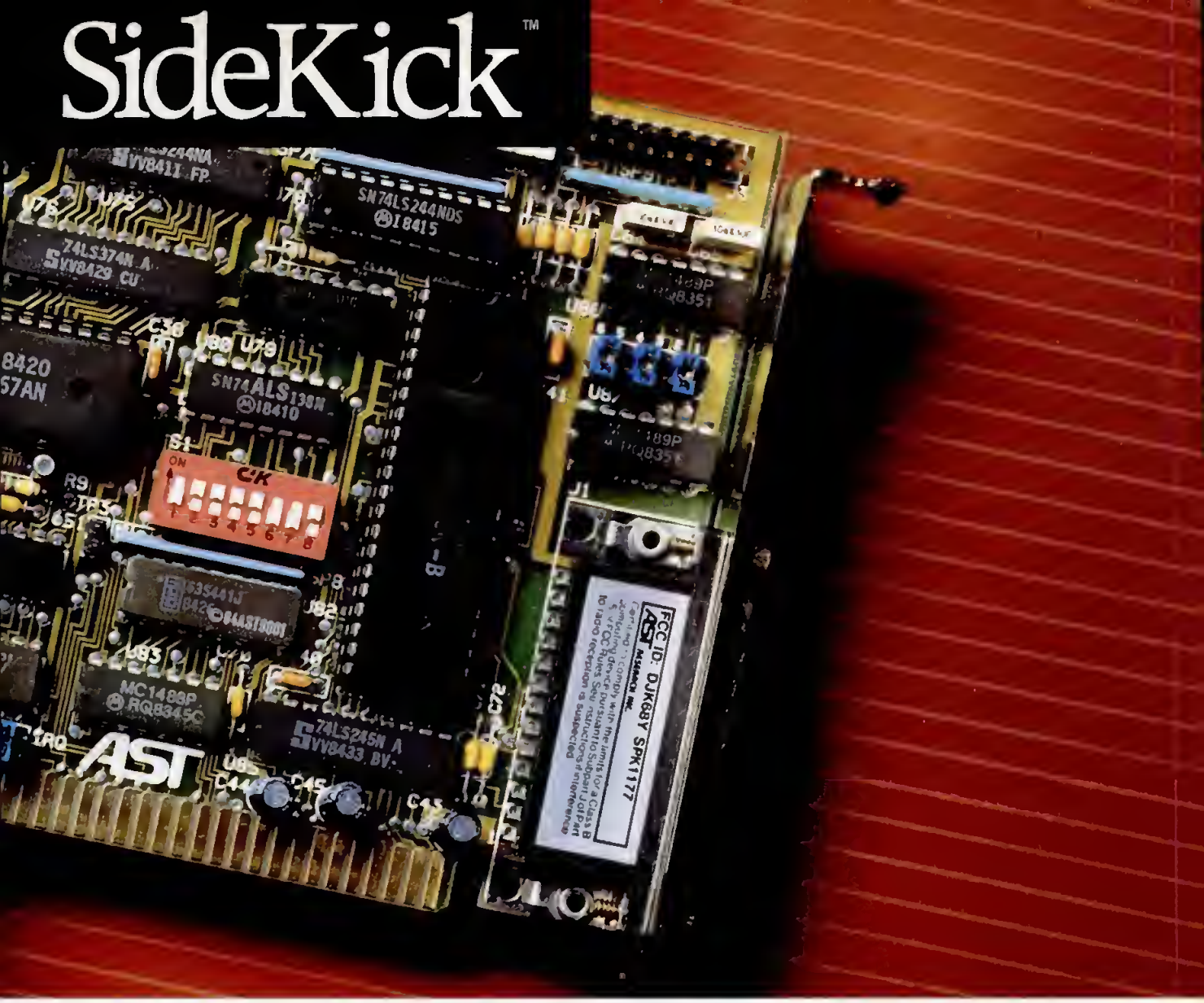

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THE SMALL BUSINESS DILEMMA:

EMPLOYEE, TEACH THYSELF

Small companies often can't afford computer training facilities, so they rely instead on consultants, one-day training sessions, and employee self-motivation to facilitate learning. Here's how five small businesses handle their training problems.

While most large companies have computer information centers and training specialists, small companies with under 100 employees usually can't afford these luxuries. Of course, some do find creative ways to deal with training, but others just muddle through, not getting the best from their software and hardware simply because no one on staff knows how to use them or has taken the time to learn.

Both time and money influence the way employees in small companies learn about computers. Because of understaffing, no one usually has time to look at training from a general perspective and set a course for the company. As a result, today's training problems are often solved with little concern for tomorrow's problems.

Ironically, employees in small companies typically have greater training needs than those who work for large corporations. Instead of having a specific job assignment, they have varied assignments that require a number of different programs. They have little time to learn many programs, and the task of staying in touch with all of them on a daily basis is a major problem. When a job must be done on a deadline, employees often do not take time to learn about a new software program because their old ways may seem faster—even though, in the long run, that program might make their jobs easier and more productive. Thus, training is often put off indefinitely as today's work is done.

NO EXTRA TIME

Finding time for computer training has been a problem for Barbara Bossany, pension administrator for Benefit Service Company in Westfield, New Jersey. She and ten coworkers use four IBM PCs for word processing and creating spreadsheets.

The company believes in formal training. If employees find a suitable course, they ask for approval and the company pays the cost. Management usually arranges for employees to take courses at the local computer store from which it buys software. According to Bossany, "Before I went for training on *MultiMate*, I went through its tutorial and was overwhelmed by all the information. They cover so

much, you can't absorb it all. The commands start to make sense only after you start using the program on real jobs."

Bossany claims she cannot learn a new program function by just reading a manual or book. She says that she needs a training course to get her started and then a real-world application before she can take on self-training. For instance, she would not take the time to learn how to use the *MultiMate* mail-merge function just for the sake of knowing how. However, when she started on a big job that would go much faster using the mail-merge, she felt justified in taking the time to learn about it.

Complex programs, such as *1-2-3*, that take time to learn and require practice to keep in form can create problems in a small company where the employees have varied responsibilities. While employees may learn to use the program for one job, they often forget the basic procedures if there's a time lapse between jobs.

Benefit Service hired a trainer to introduce its employees, including the president, to *1-2-3*. The trainer did not just talk about the program but also supervised hands-on learning. The trainees worked on a company project so that when they finished, they had completed a real job, not just an exercise to include in a training file.

DEADLY TIME LAPSES

A month after the *1-2-3* training session, the instructor came back to check on everyone's progress. Bossany says she had initially used *1-2-3* for several projects but lost the touch when she didn't use it for a while. "Now when I have a small job to do, I end up doing it by hand. Even if I have a perfect application for *1-2-3*, I don't use it if I want to get something done immediately and don't have the time to relearn the program," she explains.

Training people to use complex programs is an on-going operation. The instructor told Bossany she should spend 15 minutes to a half-hour a day working with *1-2-3* to remain familiar with it, but she does not have the time to do this. Therefore, something obviously went wrong in her training situation. She allowed her *1-2-3* skills to erode because she did not make a real commitment to continuing her efforts to use it despite problems. The training may have been at fault in failing to make her understand that *1-2-3* is an extremely valuable tool. Had the training given her a real understanding of the program, then while she might have forgotten the exact sequences of keystrokes, she would have been able to look up those details as she needed them. Moreover, Bossany might not have needed retraining if she had been less pressured by a heavy daily workload.

NOT FOR NOVICES ONLY

Not all people who need software training are nontechnical neophytes. Gordon Martin, Ph.D. and president of Martin Acoustic Software Technologies of San Diego, California has been in the computer and high-technology fields for over 30 years. His consulting company specializes in solving research and development problems for industrial, governmental, and university research efforts. Despite this background, Martin needs training in order to use new programs.

> Complex programs that require practice can create problems in a small company where the employees' responsibilities vary.

Like many technically oriented users, Martin does not usually seek formal training from an outside source but instead goes the route of self-tutoring and experimentation. He reads about the new program in manuals and books and experiments on the screen. If he has an insoluble problem, he calls his contacts within the computer community for guidance.

As the dominant software user and developer in the company, Martin learns about most of the programs that his employees use. In addition to reading the manual that comes with every program, Martin also uses books as a source of information. He owns hundreds of computer-related handbooks, textbooks, and guides.

The size of Martin's staff varies with the number and scope of projects that are underway. He typically has eight full-time employees but, as needed, also hires part-time staff. Not all of his employees use the computer—a PC with a 20-megabyte disk—but when anyone needs to be taught how to use a new program, Martin or his systems programmer does the training.

Martin's technical background allows him to approach each new program with confidence. Although he also takes responsibility for training other staff members, teaching himself will always be his biggest challenge.

PROFESSIONAL ADVICE

J. Richard Fleming, a certified management consultant, owns System Planning Associates, a Westfield, New Jersey company that specializes in giving training advice to small, privately held companies who are computerizing. The company has two Syntrex computers dedicated to word processing that Fleming describes as PCs in disguise. He also purchased a Compaq portable because he does a considerable amount of procedure writing and needs to exchange disks with clients' PCs and compatible systems. "My business is the effective use of computers. I know that they won't be used unless the people who are supposed to use them are properly trained," he says.

Although he and his secretary are the company's only two employees, Fleming applies the same rules concerning training to his company as he does to the companies for which he consults. When a new program is introduced to his company, Fleming obtains formal training. He also recommends to his clients what he calls "an initial burst of training from a qualified instructor." He believes you should pay for training. If a store offers free training, it is primarily a presale option and you usually consume these training credits before purchase. After you buy the software, however, the support is often nonexistent. He goes to very few public programs and generally advises clients to avoid them unless he has previewed them.

Fleming suggests three sources for training programs. His first choice is the local computer store where he always

makes organized training sessions part of the deal when buying software. "With a local computer store," he explains, "you have an economic hold. If the training and support are satisfactory, you will give the store more business in the future."

A second source of training is colleges and universities that offer noncredit continuing education courses and seminars attuned to the training needs of the business community. A good third option is commercial computer training centers.

Fleming suggests that clients arrange, whenever possible, personalized training tailored to their company's needs, rather than sending employees to group sessions with people from other companies. With a homogeneous group, the instructor can use examples suitable to the company's business. Ideally, Fleming says, three or four people from a company should go together to the training site. If the trainer comes to the company, the students should be locked in a room away from ringing phones. The constant press of business is a problem in a small company, and people need to get away to concentrate.

FOLLOW-UP SESSIONS

Fleming believes preparation and follow-up are very important if training is to be effective. Before a training program, he spends a half-hour discussing the type of work the office manager and/or secretary does that could be accomplished more productively with the program to be learned. Then he asks his trainees to pick out their two most distasteful operations. During the session, they apply the procedures discussed to these two real-life tasks and ask related questions. Those tasks are the first two projects that they will likely tackle after the training. "When they accomplish something worthwhile with a program, they will be inspired to continue using it," says Fleming.

The instructor who conducted the initial training should return after 30 days for a half-day follow-up session, according to Fleming. In the interim, all trainees should spend at least an hour a day using the program to overcome what Fleming calls the "concern hurdle," the feeling of inadequacy in using a new program. During the follow-up session, the trainer spends time with each employee who took the training. Students show samples of what they have done with the program and ask questions. The instructor observes what features of the program are most used and refreshes trainees on other features of the software.

Fleming believes that both management and those who will actually be using the programs should take a training session on all new programs, and he does so himself. He says he has taken courses on word processing with his secretary, even though he is not a typist. "Companies should spend the extra money to send the management people to learn about spreadsheet, database, and word processing programs even though they may not use the software themselves," insists Fleming.

> One surefire method by which a company can get its employees to learn to use computers is to help them to purchase their own machines.

Management people are often surprised at how much they use the knowledge they acquire in these training sessions, he says. Even though they may lose touch with how the program actually operates, they can intelligently discuss how jobs are to be done using the program. In addition, if an employee has to be replaced, they can more wisely interview candidates because of their intimate knowledge of the software the person will be using.

Once a core group of employees has been trained, Fleming believes, it has the responsibility to share its skills, thereby combining education and business. But, for the initial training of employees, he suggests an outside facility to ensure that each person is exposed to all the program's features by a capable instructor. In addition, employees should follow up classroom instruction by using disk tutorials. If no tutorial or a poor one is included with a program, the company should purchase a good one from a third-party source.

Fleming, who has a background in education, has examined the issue of effective training not only from the point of view of getting the job done today but also from a wider perspective. He has targeted preparation and follow-up as essential elements in effective training and has made them part of his personal training program and his clients' programs.

A MASSIVE PC PURCHASE

One surefire method by which a company can get its employees to learn to use computers is to help them to purchase their own machines. To prove its point, AlphaGraphics Printshops of the Future of Tucson, Arizona, which started as a quick printing shop in 1970 and today has 90 employees with three company stores and 120 franchises—as well as 20 PCs and Compaq Deskpros—arranged for a group purchase of the computers at a much lower price than its employees could have negotiated on their own. It laid out the money, and the employees are paying back the amount of the purchase over a 3-year period with no interest. The 14 employees who took advantage of the program chose between the PC and the Compaq Portable and among three printers.

After the computers arrived in September 1984, AlphaGraphics, at its own expense, set up 4 days of training on two consecutive weekends. The company donated two Fridays to the project and employees donated two Saturdays. The training was arranged and conducted in-house by the company's PC expert, who, in turn, called on company employees who were fluent in specific programs as guest speakers. The computer owners used their own computers during the sessions.

Donald Isaacs, vice president of marketing and advertising, purchased a computer through the program and attended the training. "We covered a tremendous amount of information in the two weekends," he says. "After one session, I was able to go home and create a spreadsheet for our family budget."

Employees now frequently work on company projects at home because they enjoy working with their computers. According to Isaacs, "In this company, peo-

ple are willing to work because we treat them as team players. On his own time, an employee in the advertising department developed a program to keep track of our Yellow Pages advertising."

AlphaGraphics employees needed training not just for standard programs but also for the company's special accounting package, adapted by a programmer from an off-the-shelf program. The initial training on this package was provided by the programmer, who has remained available to help out when specific problems arise. From time to time, other consultants are hired to help.

When new employees are hired, they are trained on a one-on-one basis by staff members. "If you have to sit down with a manual or a book to figure out how to use a program, it takes much longer. However, if someone can sit down and work with you, you can cover the same material in a third of the time," says Isaacs.

AlphaGraphics has benefited from helping employees to obtain their own computers. Those who were willing to invest in their own computers have the motivation to make this investment pay off. Both the people who were trained at company expense and the computers they own are resources for the company.

TRAINING TALL TALES

Almost every one of the 45 employees of Iscar Metals, in Hackettstown, New Jersey tells a different story about how he or she learned to use personal computers. The company, a manufacturer of cemented tungsten carbide tools, has two PCs, two XTs, and two Compaq DeskPros that are used for such applications as inventory control, purchasing subcontracting, estimating, pricing, electronic mail exchange and office functions, job costing in the factory, and shop management.

Most Iscar employees who use computers are self-trained, generally by taking advantage of two portable computers that are available for them to take home. Ed Gardner, a purchasing agent, explains, "During the work day, we simply don't have time to learn about a new program and there are too many distractions. I learned how to use several programs by taking home one of the Compaqs."

Gerry Scheyer, vice president, is an engineer who learned to use computers to avoid becoming "obsolete." The company would have bought him a computer, but he decided to purchase his own because he had a number of personal uses for it. Before buying his XT, he hired a consultant to help him pick the best computer for his needs and to teach him how to use it.

The company hired the same consultant to help Scheyer with work-related projects. The consultant comes in about once a week to work with Scheyer and his secretary, who are managing electronic mailboxes and communicating by computer with companies all over the world. The consultant helps them with problems and with establishing new procedures. For further training for himself, Scheyer plans to go to an IBM Executive Training Seminar.

Most Iscar employees are self-trained, generally by taking advantage of two portable computers that they may take home.

Frederick Magro, pricing manager, uses *dBASE II* and *1-2-3* to calculate manufacturing costs and selling prices. He was exposed to the PC before he came to Iscar but had had no formal training. He learned by using the tutorials that came with the programs and by a process of trial and error. Magro has also learned a lot from reading the computer magazines that are passed around among the employees.

"There are vast areas of computer use I have not tapped as yet. I believe I would progress faster if I could get formal training, but my problem is finding appropriate courses," says Magro.

A DO-IT-YOURSELF PROJECT

Don Block, engineering manager, has been using *PC-File* to consolidate manufacturing data. His next project is to learn to use *Symphony*. But because he has no time to do it at work, he is reading a book at home. Charlie Libidinsky, materials control manager, agrees that learning about computers in a small company is mainly a do-it-yourself project. About 2 years ago, his department was so ill-organized that he bought himself a Commodore and a spreadsheet program to ease his frustrations. When he began to spend too much time working at home to organize and generate monthly reports, he asked for a computer, and the company bought him an XT for his department.

"You can teach yourself how to use a computer program," brags Libidinsky. "I'm an example—I did it!" He learned *1-2-3* by reading Que Corporation's book *Using 1-2-3*. And he used *Mastering Symphony* by Douglas Cobb to learn *Symphony* and currently keeps it at hand as a reference book. He admits, however, that he learns by trial and error and has lost a number of spreadsheets in the process.

At Libidinsky's request, Iscar bought a videotape for *1-2-3* training, but he was very disappointed with it. "It was so superficial. I could have learned everything the tape presented by reading the first few chapters of the Que book, and I could get more training if someone who has had extensive experience with *1-2-3* would work with me on a one-to-one basis," he says.

All of Iscar's employees who use computers are constantly teaching themselves more about the software and hardware to which they have access. No one person is in charge of training so the process is not organized. However, human resources are available. Personalities and company politics often complicate issues, but through word-of-mouth, people know whom to ask when they have a problem.

Whether an organized approach is desirable within the confines of a small company is debatable. Those who want to learn to use computers are doing so. Their motivation for learning comes from the desire to do their jobs better. The self-motivation of employees seems to be the most valuable asset a small company can have when computer training is needed. ■

Loretta Holz, author of ten books and many articles, has had extensive experience in computer training.

A NEW SOLUTION from MicroComputer Accessories, Inc.

THE CASE OF THE DISAPPEARING CABLES

Here's a puzzle for you, Watson! Look at this new MicroManager!

Can't say I see anything out of the ordinary, Holmes.

Think, Watson, not about what you see, but rather what you *don't* see.

But, Holmes, everything seems perfectly in order.

Precisely! When did you ever see a printer station that was perfectly in order, Watson?

Zounds, Holmes! Some rascal has stolen the cables!

So it seems, Watson, but observe carefully—there's more to this than meets the eye. The cables have been cleverly concealed right under our very noses! Notice how each cable disappears through a knock-out hole and enters a channel in the rear of the device. Remove these vertical panels and—voila!—we discover the cables passing from level to level through secret compartments.

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Elementary, my dear Watson. But the MicroManager has solved an even deeper mystery—*where to put the printer!* See how this Basic Floor Unit is actually composed of individual sections—"modules," Americans call them. Consider the possibilities, Watson—single modules used as desktop printer or monitor stands, for keyboard storage, or what-have-you. Combined, they can form any sort of work station we need! The base has locking casters for instant mobility. There's even an optional paper refolding attachment! Cunning, isn't it?

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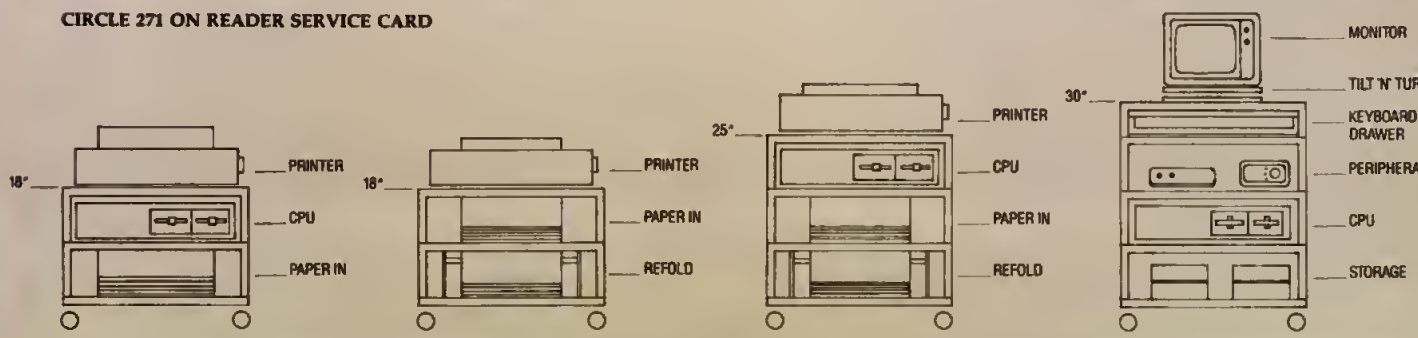
CIRCLE 271 ON READER SERVICE CARD



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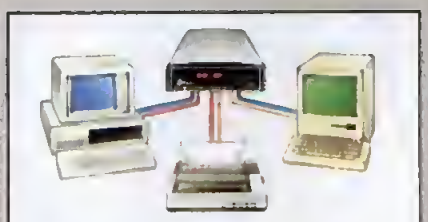
Transet 1000™ The print buffer, communications buffer, port expander, printer sharer and I/O switcher. All in one.

Anyone with a personal computer and one or more peripherals has faced the all-too-familiar dilemma. You need your computer to do an important job. But you're forced to wait for the system to finish one job (printing, communicating, whatever) before you can go on to the next one. Or you need to stop what you're doing to switch cables when you want to use another peripheral.

Wait no more. Now Hayes introduces an innovative new device that lets you perform many jobs—at the same time—independent of your computer. Transet 1000. It works with a wide range of systems and configurations. And it allows you to continually expand your system as your needs grow.

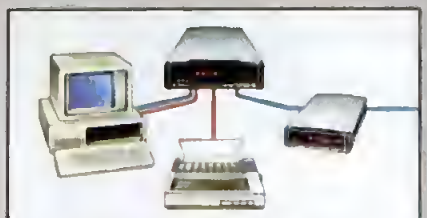
Transet 1000 frees your computer from waiting on your printer or modem—so you and your computer can go on to another task. It even lets you print out documents in pre-set formats without having to go back into your computer. At the same time, Transet 1000 can operate unattended mailbox communications—24 hours a day—even if your computer is turned off.



Two computers can share one printer with Transet 1000. Or you can use Transet 1000 to let two computers communicate with each other

In addition, Transet 1000 is a port expander and software-controlled I/O switcher. Now files can be easily directed and redirected to different peripherals, without physically changing cable connections.

Transet 1000 contains a stand-alone microprocessor, and comes with 128K of memory. It operates with any RS-232 interface computer, and has optional accessory kits available for the IBM® PC and PC XT, Macintosh™ and Apple® IIc. Kits contain the necessary host cable, a user guide and menu-driven software that lets you graphically set up or customize port parameters and printing formats. Cables available for IBM PC AT, other computers and peripherals.



Even while printing, Transet 1000 acts as a communications buffer and 24-hour mailbox. And I/O switching lets you route information among peripherals without switching cables

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CIRCLE 229 ON READER SERVICE CARD

Photograph: Dennis Kitchen

THE CORPORATE SOLUTION:

CLASSES FOR THE MASSES

Faced with a sudden increase in demand for microcomputer training, large companies tend to favor classroom instruction. However, they are finding that courses must be tailored to individual needs in order to be economical and effective.

Tom Wright, a financial analyst, administers pension and profit sharing plans for the corporate division of Pittsburgh Plate Glass (PPG). Although his job description doesn't mention computers, a PC-XT claims the larger portion of his desk at corporate headquarters.

Neither Wright's more than 10 years of experience nor his MBA prepared him for the intricacies of working with computer hardware, electronic spreadsheets, and word processors. His introduction to the PC came in the heat of battle. Faced with the grueling task of calculating the present value of a pension plan for a group of 400 employees, Wright approached a PC-wise colleague in another department. Together they built a *1-2-3* spreadsheet to perform the calculations. Within a day, they had the computer cranking out results—and saved about a week over the conventional calculation procedure.

"The first application started the ball rolling," Wright said. "To learn more, I enrolled in an introductory *1-2-3* class. Now I have 30 to 40 applications on my PC and spend about half of a typical day on the computer. It really helps increase my productivity."

BALANCING THE EQUATION

Wright is the exception, not the rule. More than one well-intentioned manager has found that combining PCs and people does not automatically raise productivity. The equation requires a critical, seemingly obvious, but often overlooked transitional element called training.

The different approaches to training rival the myriad configurations of PCs themselves. Besides live training in a classroom or seminar setting, there are tutorials (either book or disk-based), video and audio cassette tapes, and individual instruction. All these methods are used to varying degrees, especially in small businesses. Large companies, however, where PCs number in the hundreds or thousands, usually resort to structured classes.

At Pittsburgh Plate, for example, PC education is supervised by Margaret Foote. Ever since 1976, when she built her first computer, a Cromemco, from a kit, colleagues have been coming to her informally for PC guidance. In January 1985,

she officially assumed the title of PC consultant for the glass division.

"The training function is part of PPG's Information Resource Center, a joint project between the glass, chemical, and corporate divisions," Foote explains. "The center provides a central focus for training and other PC-related functions. In the past year, over 250 people have taken classes in PC use including *1-2-3*, *Symphony*, and *DisplayWrite 2*."

A monthly newsletter lists the courses available. Classes range in size from 6 to 20 students: when a class numbers more than 12, an assistant instructor is present to help answer questions.

Besides organizing classroom instruction, Foote calms distraught users, sets up workshops for high-level management, and demonstrates new equipment. Current inventory includes such products as a Hewlett-Packard Laserjet printer, Polaroid Slide Palette, and numerous desktop and portable PCs from IBM, Columbia, and Wang. The need for instruction keeps pace with the steadily growing population of PCs, which currently numbers 500—a twofold increase within the past year. To meet the demand for PC instruction, Foote relies on outside vendors. She estimates that such training costs $150 to $200 per day for each student, depending on the subject.

Foote has three main criteria by which she evaluates a training organization. "First," she says, "its instructors must have an educational as well as a technical background. In general, I think it's easier to teach computing to a person with a background in education than it is to teach a technically oriented person how to train other people.

"Second, since PCs are by definition personal, the school should have a machine for each student in a class. The key to learning how to use the computer lies in hands-on doing.

"The last consideration is convenience. Ideally, the classrooms should be within walking distance. For the 2,000 employees at our headquarters, this means downtown Pittsburgh."

Johnston stresses that the primary goal of a workshop is not to teach users the entire operation of a piece of hardware or software, but simply to show them how to get what they need from a given product. "If a person's job doesn't require graphing," she says, "why waste time teaching it?"

TRAVELERS IN TRAINING

One of the first corporations to establish an information center was the Travelers Insurance Company of Hartford, Connecticut. Since its opening in 1982, Travelers's information center has attracted attention from such newspapers as the *Wall Street Journal* and the *New York Times*. It includes a computer store—complete with system specifications and prices posted over each machine—so that employees can try out hardware and software in a retail environment. When an employee selects the machine he or she wants, Travelers buys it for that person's on-site use. More than 6,000 PCs have been purchased for employee use so far, and the company expects to buy 19,000 more by the end of the decade.

Besides supplying hardware and software to in-house customers, the store also organizes training. Last year, over 1,600 employees came to the workshops in the store's classroom, which contains 11 portable PCs and holds up to 20 students (2 to each machine). An oversized display monitor on the instructor's PC allows the entire class to watch the instructor go through each of the examples step by step.

Joan Johnston, director of the store's operations, recalls that the original computer store did not include a training classroom. "We started with one-on-one sessions," she explains. "One of our staff members, sitting at a PC workstation with one user, would slowly walk the user through the menu of a particular software package, trying this or that, getting in and out of trouble. After a while I found that four or five systems were occupied with one-on-one sessions for the same software package. At that point, it became more cost-effective to do workshops."

Within weeks after that decision was made, the computer store had its own fully equipped classroom, and company newsletters announced the workshop schedules. One-on-one sessions still play a role in training, especially for new products with a relatively small user base. But as the volume increases, group workshops conducted by data processing professionals take over the training.

The workshops have no instructors in the traditional sense. "I prefer the term 'leaders'," says Johnston, "and the teaching is 'enablement' instead of training. I want to avoid the stereotypes of academic instruction."

Eight leaders now conduct these workshops, which also deviate from traditional seminars in length. "Each workshop is short," says Johnston, "It lasts from 1 to 2½ hours, depending on the subject. You can't remove people from the workplace for several days and expect them to remember everything about a new concept. Furthermore, how many executives can afford that much time away from the office?" Johnston stresses that the primary goal of the workshops is not to teach users the entire operation of a piece of hardware or software, but simply to show them how to get what they need from a product. "If a person's job doesn't require graphing, why waste time teaching it?" she says. "When you need to do graphing, you can find out how through another workshop." If a user still has problems after a workshop ends, the staff follows through with on-site or telephone consultation.

As new programs appear on the market, members of the staff evaluate them. If the store decides to carry a product, Johnston

assigns a leader to "tech up" on the program, then sets up workshops according to demand. Recent subjects included a demonstration of Travelers' *Decision Images* software and sessions on PC use, *1-2-3* graphics, and *1-2-3* data commands. All the workshops are closely geared to the needs of Travelers's insurance business—an advantage over the general courses offered by outside vendors.

Johnston spends much of her time showing the computer store and learning center to visitors from other organizations, an average 25 presentations a year. Recently, officials from France's Center for the Study of Systems and Advanced Technologies came to Hartford for a look.

TAKING THE INSIDE ROUTE

Though in some companies, PC training is an offshoot of the management information systems department, other companies such as Westinghouse have made it a part of their professional training departments. Through its training department, Westinghouse Electric Corporation offers 125 courses covering everything from presentation skills to effective writing. Twenty-five of these courses teach PC-related subjects. A similar selection of courses is available to the 120,000 employees of Westinghouse International at any of the company's locations.

Chuck Fritz, manager of professional training at Westinghouse Electric, explains that the Electric division is only one

A FRESH LOOK AT MANPOWER

The need to teach computer skills to thousands of unskilled workers led Manpower to develop a new training technique.

How's this for a training nightmare: You're responsible for teaching computer skills to several hundred thousand unskilled workers. Each student's instruction must be completed within 8 hours. Many of these people will have to be taught in a language other than English. Naturally, costs should be held to a minimum—specifically, less than $30 per person.

Few professional trainers would volunteer for this job. Yet at Manpower Incorporated, an office temporary agency, a monumental training task like this is par for the course.

According to Mitchell Fromstein, president of Manpower, "Less than a handful of this nation's 18 million clerical workers can operate automated equipment. This situation demands a fresh look at our training techniques."

The "fresh look" resulted in a computer-based training program called *Skillware* that involves no teachers, classrooms, or manuals. *Skillware* functions from a disk. It leads an operator through word processing in a tutorial fashion. Lessons are grouped according to activity such as cursor movement, word wrap, indenting, tab setting, global search, and so on. A summary concludes each set of lessons, followed by a short quiz administered by the computer. The instruction is self-paced, but most complete the training in about 8 hours.

TERMINAL FRIENDLINESS

Skillware's designers went to great lengths to endow the system with a friendly, human element. The first display, for example, extends the greeting, "Hello Edward!I Welcome to my screen. I'm your IBM PC." Later, when introducing cursor use, *Skillware* carries reassurance to a new level: "You are in absolute control of me, Edward. You can make me go anyplace you want me to go."

Skillware first appeared in 1983, backed by a $5 million investment. Initial versions were implemented on popular dedicated word processors sold by IBM, Lanier, NBI, Wang, and Xerox, among others. That group now includes the IBM PC with a version for *DisplayWrite 2*. Each of Manpower's 550 domestic offices is equipped with a PC to handle this training. *Skillware* is distributed in English, French, German, and Spanish for Manpower's international offices.

In a sense, Manpower was forced into the role of teacher. "We realized we had to retool our work force somehow, or the market was going to pass us by," says Fromstein.

Over the past year, about 20,000 temporary workers have completed the training. Projections for next year peg that figure at 150,000. To gauge an operator's ability, Manpower has developed a test that assesses speed and accuracy. Any weak areas identified can then be corrected.

THE CHINESE CONNECTION

The company's success has even attracted the attention of the Chinese government. At the request of China's Ministry for Foreign Economic Relations and Trade, Manpower plans to open a training center there. The center will teach Chinese workers how to operate the office equipment—including PCs—that fuels the Western business world.

Meanwhile in this country, Manpower plans to increase *Skillware* offerings on the PC. "We recently added packages for *VisiCalc* and *1-2-3*," says information specialist Sharon Canter. "In the future, we'll support any software that the business community needs."—**Edward Joyce**

of Westinghouse's 26 business units. "Since the business units are relatively autonomous," he says, "probably every type of training imaginable is being used. However, our courses are available to any division within Westinghouse."

For PC training, he says, the department usually sets up 10 full-size PCs at a hotel near the offices of the group requesting the course. The 2- to 3-day courses take place in a classroom setting. Two students are assigned to each PC and take turns typing at the keyboard.

Fritz, a veteran instructor of 16 years, believes that two students per PC is better than a one-to-one ratio because the arrangement gives one person a chance to take notes and listen carefully while the other concentrates on the keyboard. Fritz travels about 25 percent of the time and has recently taught PC courses in France and Korea. He added that the courses he and the other nine instructors in the training department teach cost about 30 percent of what the same services from an outside vendor would cost.

Companies that purchase PCs by the truckload favor classroom seminars and workshops over computer-based training, book tutorials, and audio and video tapes. However, even classroom instruction presents a dilemma—namely, whether to contract an outside vendor or establish in-house training.

BRINGING IN OUTSIDERS

Even companies with highly qualified in-house training groups occasionally turn to outside vendors. Both Westinghouse and PPG contract out much of their training to two organizations located near their headquarters in downtown Pittsburgh: PC Solutions and the University of Pittsburgh Computer Learning Center.

Ralph Burt, executive vice president of PC Solutions, itemized the main functions of his company as software development, training, and executive briefings. "The amount of money companies are willing to commit to training has picked up considerably in the past 6 months," he observed. "Before, management wouldn't hesitate to drop $5,000 on hardware, $2,000 on software, $1,000 on ergonomic furniture, then try to get by with a $50 tutorial. Now they're realizing that $300 to $500 on a training seminar is a good investment when compared to a system's total cost."

Carla Depperman, director of the University of Pittsburgh Computer Learning Center, also values live training. "There are many reasons why most people favor a classroom environment over computer-based training or book tutorials. First, you can't ask questions of a book or disk. Second, by signing up for a course, you make an overt commitment to attend and complete the work; its structure imposes a subtle discipline not found in self-paced tutorials. Third, since you are physically removed from the distractions and interruptions of the office, you can direct your full attention to learning the subject."

If there's a trend to be spotted in the field of PC training, it lies in the idea of a computer learning center affiliated with an educational institution. The Computer Learning Center is actually a partnership between the University of Pittsburgh and Software Alternatives Incorporated (SAI) of Toledo, Ohio, which has similar arrangements with other universities. SAI provides the expertise to set up a learning center in a short time—approximately 6 weeks—and the university manages it, sponsoring noncredit courses through its continuing education division.

Trainers for the center come from three sources: academic instructors with strong business acumen, business professionals who like to teach, and private consultants. SAI centers have already been established at the University of Toledo, Wayne State University in Detroit, and the College of Mount St. Joseph's in Cincinnati. SAI's future plans call for expansion into other large metropolitan areas.

The directors of these centers tailor seminars around a company's subject and schedule requirements. At the Pittsburgh center, Depperman emphasizes the curriculum's flexibility and responsiveness, using a course for attorneys as an example. "A local law firm wanted to improve its business with high-tech companies. Its attorneys didn't need to know the operational idiosyncrasies of individual word processors and spreadsheets to accomplish this. So we designed a customized seminar that focused on the concepts, capabilities, and jargon of computing."

Most of the 2,000 students who have attended classes at the center in the past year were enrolled in standard courses offered year round in a classroom equipped with 24 PCs. Classes usually meet twice a week for 4 weeks, or 12 hours of instruction. The curriculum covers subjects ranging from introduction to word processing to Turbo Pascal to computer-aided design. About 70 percent of the participants have the $165 tuition paid by their employers.

According to Depperman, spreading the instruction over a 4-week period has several advantages. Students can apply what they've learned to problems at the office. The shorter meeting periods mean fewer conflicts with regular business commitments. And the PC-equipped classroom is available in evenings and on weekends during "open lab" periods. These periods allow students to gain extra hands-on experience between regular training sessions, Depperman says.

DIFFICULT DILEMMAS

The problem of large-scale PC education has no single solution. Like many business problems, the answer lies with flexible application of many resources. In general, companies that purchase PCs by the truckload favor classroom seminars and workshops over computer-based training, book tutorials, and audio and video

cassette tapes. However, even classroom instruction presents a dilemma—namely, whether to contract with an outside vendor or establish in-house training.

Outside vendors tend to offer a robust curriculum. Their trainers make a living by staying abreast of the technology. When it comes time for a course in a new product, they generally have an instructor ready.

Having fully equipped classrooms is another point in their favor. Outfitting 20 PC workstations with printers, color monitors, and software can be an expensive proposition—one that some companies would rather avoid.

In-house training, on the other hand, guarantees control over the course. Employees who attend a spreadsheet class, for example, learn not only how to tally numbers in hypothetical situations at the Widget corporation but how to apply those calculations to problems found in their own businesses.

When a company has a vendor tailor a course to its specifications, control often extends to the choice of instructors, too. One company official tells of a situation where the instructor scheduled by an outside vendor became ill. "The vendor substituted a programmer to teach an introductory course to an audience of eight marketing directors. His presentation was so steeped in technical jargon that he lost the entire class in the first hour. We had to ask for a replacement in the next session."

ANOTHER ANSWER?

Of all the training options, the least expensive may be one of the most effective. It involves no instructors' salaries, does not disrupt the normal flow of business, and works equally well at all levels from executive vice president to mailroom clerk. Employees start out with the highest motivation, learn at their own speed, and receive comprehensive hands-on instruction. This miracle is an employee PC purchase plan, which offers the company's corporate discount rate to employees who buy PCs for personal use. Although less methodical, this type of training is effective. After all, few seasoned PC owners enroll in introductory computer classes. ■

Edward Joyce is a free-lance writer based in Virginia.

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DOING IT YOURSELF:

A BLUEPRINT FOR TRAINING

Creating a specialized training program for your company isn't as difficult as it sounds; all it requires is the right kind of planning and organization. This do-it-yourself guide to computer training development gives you nine practical steps to follow.

Company 1 needs to train its employees to do word processing with *MultiMate*, in conjunction with its individualized company correspondence forms. Company 2's employees must learn to use its new custom inventory system. Only tailor-made microcomputer training programs will fit the bill for both companies.

The need for training tailored to particular organizations, tasks, people, or situations has prompted more and more corporate professionals to take on the development of PC training internally. Often the responsibility falls on individuals with no real training experience or expertise. With careful planning and the nine steps outlined here, however, practically anyone can budget, conceive, and execute a training program that looks good, runs well, and teaches exactly what the company wants its employees to learn about using the personal computer.

THE NINE STEPS

Ideally, developing your own PC course is a nine-step process. You must:

1. Determine the training need and identify your audience
2. Evaluate the resources
3. Plan and price the best program choice
4. Gain management support and funding
5. Determine and review the scope
6. Create and review the design
7. Complete and review the course
8. Test and fix it
9. Evaluate the results.

In large organizations, the order in which these nine steps proceed may depend on committee input, written requests and justifications, and formal channels of approval. In smaller companies you may find yourself in the position of doing all the planning and approving yourself, on your own time lines, with the steps guiding your activities informally.

IDENTIFYING THE NEED

Determining the training need and identifying the target audience (step 1) is the most crucial step. An educationally sound and technically accurate program that meets no one's needs is simply a waste of resources. You must target the PC training to address a real training need and at a level appropriate to your audience.

Regardless of the size or formality of the approach, you should always state the training need in the following terms: What are the problems in integrating PCs into the workplace? How can you solve them through training? How can solving the problem significantly improve the company's functioning?

Then test the validity of your stated training need. If you're the only one who thinks "everyone else" needs training, you may not be on the path to success. Look at these two examples:

Company A's training need: "Managers do not know how to use the *Symphony* template to complete variance reports. If they learn to do so, the variance reports can be in a consistent form for automatic compilation." Describing this need clearly to employees throughout the company should provide you with useful feedback that either supports or questions the validity of the effort.

Company B's training need: "For more efficient use of top managerial resources, we need to train our management ranks to use personal computers." This training need is too general. Good intentions are hard to argue with. But training needs must be specific to help you gain the advice or support you need and to help you direct the training effort.

Getting others' opinions will prevent you from applying training skills needlessly to a problem that doesn't require them. For example, one company found that there was a good deal of resistance to implementing a PC-based inventory tracking system. Its managers assumed that training would cause the resistance to subside. The staff was trained, and the system was installed, but a high number of system errors revealed that problems still existed. When they investigated, management found that the resistance didn't stem from a lack of education, but from the misconception that the inventory system would change or eliminate some jobs.

If a legitimate training need exists, assessing your audience is a factor equally as important as analyzing your training need. For training to be successful, you must be familiar with the audience, and you must be prepared to meet its needs. You should be able to answer these questions: How many people need training? Where are they located? How much do they already know about the PC? What PC-related skills do they have? What education have they had? What do they do on the job? What will they be doing with PCs?

After evaluating the training need and the target audience, your next move is to identify the resources that are available to you. Creating PC training programs requires a combination of PC knowledge and training expertise. Evaluate where your strengths lie and seek the professional help you need.

EVALUATING YOUR RESOURCES

After evaluating the training need and the target audience, your next move is to identify the resources available to you (step 2). Creating PC training programs requires a combination of PC knowledge and training expertise. Evaluate where your strengths lie and seek the professional help you need. You don't need to secure all the resources at this time, but you want to know where you can get advice.

If you are part of a large organization, internal resources (like a training department or an information center) may be able to lend some support. Regardless of your company's size, resources like magazine articles, business associates, professional organizations, and books can always be helpful.

If your experience with PCs and training is not strong and you lack the resources you need, a good consultant can help you avoid costly mistakes. If you need to shop for consulting expertise, look for a person with PC training experience, solid references, appropriate work samples, and concern about your needs as well as one you can work with well.

Also, consider carefully what the consultant is selling. Some consulting groups offer a range of services including planning support and training development in a wide variety of media. Some are willing to recommend alternatives that meet your needs even when that recommendation may mean less business for them. Other firms sell one solution and don't pay much attention to your situation.

Don't feel that you must rush into a lengthy or expensive consulting contract. You can opt to hire the consultant for a minimum number of hours, get a feel for how he works, and then make a larger commitment.

PLANNING AND PRICING

When you're planning and pricing the best training alternatives (step 3), you'll want to consider the most-efficient means of training development and delivery as well the most-effective media to use.

Staff availability and expertise are usually the deciding factors when determining whether to involve internal staff or consultants. If you venture into a new training media (like video disk), you can hire an experienced consultant to hold your hand through the first project. After gaining some experience, you can determine whether to make an investment in an internal staff development team.

When you choose among the various forms of training media available, consider whether the trainees need a conceptual introduction (video is good) or require

hands-on experience (try a diskette-based course or a classroom workshop). After you identify two or three possible media, compare their costs, taking both development and delivery costs into consideration. For example, self-instructional training may require a large investment up front for video equipment, workbooks, or software development. And an hour of diskette-based training may consume 300 to 500 hours of development time.

If you do not want to program the course from scratch, an authoring system may be the answer. These systems create an environment in which nonprogrammers can create training software. (See accompanying sidebar for a list of available authoring systems.)

Once developed, self-instructional training courses are inexpensive to deliver, and most can be reused. Diskette-based courses are especially useful when you need to give hands-on experience to a widespread population.

Classroom training, complete with hands-on activities, can cost less to develop than diskette-based courses, but the delivery costs for labor, hardware, and software can be high.

To compare the costs of different alternatives, use these calculations:

- For development costs, add labor involved in development plus travel plus equipment (supplies, hardware, and software).
- For delivery costs, multiply cost of student per hour by number of hours students will be in training; add cost of student travel; multiply by number of students; and add cost of instructor labor and travel plus cost of facility plus equipment.

In addition to considering the costs of your training program, look for possible quantifiable benefits. Will the PC training help reduce or prevent other expenditures? Quantifiable benefits can be viewed as offsetting the overall costs of development and delivery of the training.

Training itself may represent a source of revenue. If your training program is generic enough to interest people outside your company, consider marketing the product through a large PC-training vendor. Several of the companies selling diskette-based training will gladly consider commercial distribution of courses that have been developed by corporations for their own use. Having a training vendor sell your program could offset some of the expenses incurred in its development.

BOOKS TO HELP YOU TRAIN

You'll save money and avoid mistakes if you take these authors at their words.

Intelligent Tutoring Systems
D. Sleeman and J. Brown
Academic Press, Inc.
Orlando, FL 32887
(305) 345-4100
Copyright: 1982
Cover Price: $39.50
ISBN: 012-648-680-8
CIRCLE 681 ON READER SERVICE CARD

Goal Analysis
Robert Mager
Fearon Press
19 Davis Dr.
Belmont, CA 94002
(415) 592-7810
Copyright: 1984
Cover Price: $9.95
ISBN: 0-8224-4339-2
CIRCLE 686 ON READER SERVICE CARD

Measuring Instructional Results
Robert Mager
Fearon Press
19 Davis Dr.
Belmont, CA 94002
(415) 592-7810
Copyright: 1984
Cover Price: $9.95
ISBN: 0-8224-4340-6
CIRCLE 685 ON READER SERVICE CARD

Preparing Instructional Objectives
Robert Mager
Fearon Press
19 Davis Dr.
Belmont, CA 94002
(415) 592-7810
Copyright: 1984
Cover Price: $9.95
ISBN: 0-8224-4341-4
CIRCLE 689 ON READER SERVICE CARD

The Elements of CAL
David Godfrey and Sharon Sterling
Prentice Hall
200 Old Tappan Rd.
Englewood Cliffs, NJ 07675
(201) 592-2000
Copyright: 1982
Cover Price: $22.95 (hardcover), $17.95 (softbound)
ISBN: 0-8359-1701-0 (hardcover), 0-8359-1700-2 (softbound)
CIRCLE 682 ON READER SERVICE CARD

Analyzing Performance Problems
Robert Mager
Fearon Press
19 Davis Dr.
Belmont, CA 94002
(415) 592-7810
Copyright: 1984
Cover Price: $9.95
ISBN: 0-8224-4336-8
CIRCLE 687 ON READER SERVICE CARD

Developing Attitudes Toward Learning
Robert Mager
Fearon Press
19 Davis Dr.
Belmont, CA 94002
(415) 592-7810
Copyright: 1984
Cover Price: $9.95
ISBN: 0-8224-4337-6
CIRCLE 688 ON READER SERVICE CARD

Computer-based Training: A Guide to Selection and Implementation
Greg Kearsley
Addison-Wesley Publishing Co., Inc.
Reading, MA 01867
(617) 944-3700
Copyright: 1983
Cover Price: $29.95
ISBN: 0-201-10333-8
CIRCLE 683 ON READER SERVICE CARD

CAI Sourcebook
Robert L. Burke
Prentice Hall
200 Old Tappan Rd.
Englewood Cliffs, NJ 07675
(201) 592-2000
Copyright: 1982
Cover Price: $21.95 (hardcover), $15.95 (softbound)
ISBN: 013-110-155 (hardcover); 013-110-148 (softbound)
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Colossal cost

✓ denotes IBM-AT compatibility.

SOFTWARE

We only carry the latest versions of products Version numbers in our ads are current at press time

Aptec
- ✓Rainbow Writer Color Text Formatter 2 1 $119
- ✓Rainbow Writer Screen Grabber 1 1 69
- ✓ColorScreenPrint 2 0 59

Ashton-Tate
- ✓dBase II 2 43 call
- ✓dBase III 1 1 call
- ✓Framework 1 1 call

Best Programs
- ✓Personal Finance Programs 1 1 65
- ✓PC/Professional Finance Program II 3 0 149
- ✓PC/Fixed Asset System 3 0 329
- ✓PC/Tax Cut *(for 1984 taxes)* 49
- ✓PC/Personnel (Level 1) 3 0 279
- ✓PC/Personnel (Level 2) 3 0 419
- ✓PC Personnel (Level 3) 3 0 559

Bible Research
- ✓THE WORD 1 0 *(KJV Bible)* 145

Borland International
- ✓Sidekick 1 5 (non-protected) 48
- ✓Turbo Pascal 3 0 37
- ✓Turbo Pascal 3 0 w BCD 59
- ✓Turbo 8087 3 0 59
- ✓Turbo 8087 3 0 w BCD 72
- ✓Turbo Toolbox 1 0 30
- ✓Graphics Toolbox 1 0 30
- ✓Turbo Tutor 1 0 19
- ✓Superkey 1 0 37

Broderbund
- ✓Bank Street Writer 49

Digital Research
- ✓GEM Desktop 1 1 30
- ✓GEM Draw 1 0 *(includes GEM Desktop)* 93

Evergreen
- ✓One-Write Plus 1 0 169

FriendlySoft
- ✓FriendlyWriter 2 0*(with FriendlySpeller)* 55

Funk Software
- ✓Sideways 2 11 37

Harvard Software
- ✓Harvard Project Manager 1 1 209
- ✓Harvard Total Project Manager 1 0 279

Hayes
- ✓Smartcom II 2 1 89

Infocom
- ✓Cornerstone 1 0 289

Lifetree
- ✓Volkswriter Deluxe 2 2 *(with TextMerge)* 159
- ✓Volkswriter Scientific 1 0 289

Living Videotaxt
- ✓ThinkTank 2 0 *09

Micro Education (MECA)
- ✓Managing Your Money 1 52 99
- ✓Running Program (Jim Fixx) 1 2 49

PC Connection Software Special

expires August 31, 1985

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- Power Speed Ease of use
- Comprehensive relational database system with all the application development features of dBase III
- 7 "heavyweight" programming features
- Twice as many user-convenient features as most systems
- Can import data directly (automatically creates database) from dBase II, 1-2-3, Symphony PFS file and others $357

Package to upgrade R:base 4000 to R:base 5000 $125

Micro Data Base
- ✓Knowledgeman 1 07 $249

Micropro
- ✓WordStar 3 31 179

Hard disk recommended for Wordstar 2000 & Wordstar 2000 Plus
- ✓WordStar 2000 1 01 259
- ✓WordStar 2000 Plus 1 01 299

Microrim
- ✓R:base 4000 1 15 259
- ✓R:base 5000 1 0 special
- ✓Upgrade Kit to R:base 5000 special
- ✓Extended Report Writer 1 2 85
- ✓Clout 2 0 135

Microsoft
- ✓Multiplan 1 2 125
- ✓Microsoft Spell 1 0 30
- ✓Microsoft Word 2 0 235
- ✓Microsoft Mouse with software 3 0 135
- ✓Microsoft Serial Mouse with software 3 0 135
- ✓Microsoft Project 1 01 155
- ✓Microsoft Chart 1 01 155

Microstuf
- ✓Crosstalk XVI 3 5 99
- ✓Intoscope 1 0 129
- ✓Transporter 1 3 *(includes Crosstalk)* 169

MultiMate International
- ✓MultiMate 3 3 call

PCsoftware
- ✓PCcrayon II 39
- ✓Executive Picture Show 139
- ✓CREATABASE 47

Peter Norton
- ✓Norton Utilities 3 0 59

Powerbase Systems
- ✓Powerbase 2 1 call

Rosesoft
- ✓Prokey 4 0 89

Satellite Software
- ✓WordPerfect 4 0 $239

Software Group
- ✓Enable 1 1 call

Software Publishing
- ✓PFS File B 01 84
- ✓PFS Graph B 01 84
- ✓PFS Plan A 01 84
- ✓PFS Proof B 00 59
- ✓PFS Report B 01 77
- ✓PFS Write B 01 84

Virtual Combinatics
- Micro Cookbook 29

Warner Software
- ✓The Desk Organizer 2 0 69

TRAINING

ATI

✓SKILL BUILDER PROGRAMS

Intro and How To Use		
Word Processing	MS-DOS (2 0)	
Business Software	PC-DOS (2 1)	
Data Bases	Home Accountant	
Compaq	VW Deluxe	
IBM-PC	Basic	

each 32

✓*TRAINING POWER PROGRAMS*

How to Use		
dBase II	dBase III	Lotus 1-2-3
MS Word	Easywriter II	Multimate
Multiplan	Supercalc 3	Framework
Symphony	Wordstar	TK!Solver

each 49

Comprehensiva Software
- ✓Intro to Personal Computing 39
- ✓Intro to Databases 39
- ✓Intro to Communications 39
- ✓Intro to the Operating System (PC Tutor) 39

Individual Software
- ✓The Instructor II *(all new!)* 35
- ✓Professor DOS 47
- ✓Tutorial Set *(both items above)* 75
- ✓Professor Pixel 47
- ✓Typing Instructor 39

Scarborough Systems
- MasterType 35

EDUCATIONAL

Digital Research
- Diagnostic Test (PSAT) 14
- OwlCat SAT *(15 hour)* 63
- OwlCat SAT *(60 hour)* 169

FriendlySoft
- ✓FriendlyWare/PC Introductory Set 35

Spinnaker

Educational Games for Young Computer Users *(All require graphics board)*
- Delta Drawing *(ages 4 to adult)* 34
- Snooper Troops I *(ages 10 to adult)* 30
- Most Amazing Thing *(ages 10 & up)* 27

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- Smartmodem 1200B *(w/Smartcom II)* $369
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- Smartcom II 2.1 89
- *Compucable's Smartmodem-to-IBM Cable* 19

Hercules Computer

- Hercules Graphics Card *(parallel port)* special
- Hercules Color Card *(parallel port)* 169
- Graph-X Software 42

Kensington Microware

- Masterpiece 97

key tronic

Deluxe keyboard (KB 5151) 169

Kraft

- Joystick 35

Maynard Electronics

Floppy Drive Controller 119

Mouse Systems

- PC Mouse (w/software, pad, & PC Paint) 139

NEC

- Pinwriter P2-3 *(IBM, 80 column)* 559
- Pinwriter P3-3 *(IBM, 132 column)* 759
- Spinwriter 2050 *(3550's little brother)* 679
- Spinwriter 3550 *(IBM-PC compatible)* 1099
- Spinwriter 8850 *(IBM-PC compatible)* 1489

Orchid Technologies

All Orchid Boards come with PCnet Drive (Ram disk), PCnet spool (print spooling), disk caching & partitioning

Blossom 64k upgradeable to 384k with clock calendar, serial and parallel port 199

PCnet Daughter Board (piggybacks to Blossom) with version 3.0 networking software call

PCnet Blossom 64k Blossom Board with the Daughter Board installed call

PC Turbo 186 w/128k call

- PC Net *(stand alone card)* call

Peladin - See VisiCorp

Peradise Systems

- Modular Graphics Card 275
- Multidisplay Card 195
- 5-Pack (ØK expandable to 384k) w/clock and serial port 169

Princeton Grephics

- HX-12 RGB monitor *(690 x 240)* call
- MAX-12E Amber monochrome monitor call
- SR-12 690 x 480 call
- Scan Doubler Board for SR-12 call

Quadram

Expanded Quadboard with clock calendar, parallel serial & game port, I/O bracket, and Quadmaster software

64k upgradeable to 384k 199

384k (fully populated) 249

- Microfazer Printer Buffer (parallel) w/copy MP 64 (64k) *upgradeable to 512k* 159
- Quadcolor I 197
- Quadchrome RGB Monitor 469
- Quadchrome II 449

SMA (Systems Management)

PC-Documate Keyboard Templates *available for*

DOS/Basic 1.1	Supercalc 3
DOS/Basic 2.0-2.1	Wordstar
Lotus 1-2-3	Turbo Pascal
Symphony	WordPerfect
Multiplan (IBM)	dBase II
DOS 3.3.1	dBase III
Wordstar 2000	Framework
Multiplan (Microsoft)	Multimate
Volkswriter Deluxe	each 12

Toshiba

- P351 printer call
- P1340 printer call

VisiCorp

- Visi Mouse *(2 button Mouse Systems mouse, PC Paint & pop-up menu software)* 89

WICO

- Joystick 35

DRIVES

All floppy drives are completely pre-tested and are supplied with a printout of the test results. They are shipped with complete step-by-step installation instructions. Drives are 320k/360k

Control Data (CDC)

(5¼") half-height drive (DS,DD) 89

(5¼") full-height drive (DS,DD) 99

Free mounting bracket with each pair of half-heights.

IOMEGA

- Bernoulli Box 20 Meg 2489
- 10 Meg cartridge 48

Maynerd Electronics

Internal Hard Disk (10 Meg) with WS-1 Controller 797

Internal Hard Disk (10 Meg) with WS-2 Controller $969

Tendon

TM 100-2 (5¼") *full-height drive (DS,DD)* 109

10 Meg Internal hard drive w/controller (complete package) 479

TEAC

FD-55B (5¼") *half-height drive (DS,DD)* 109

Free mounting bracket with each pair of half-heights

MEMORY

64k Memory Upgrade Set for IBM-PC or XT system board 10

64k Memory Upgrade Set for any memory board *specify make of board* 10

Install memory upgrades & run diagnostics *at time of board purchase only* 10

- 256k Memory Upgrade Set for any IBM-AT memory board 49

DISKS

Fuji

- Disks for IBM-AT (96 TPI) *Box of 10* 39

MAXELL

- Disks for IBM-AT (96 TPI) *Box of 10* 45.

Verbatim

Datalife Disks SS/DD *Box of 10* 21

- Datalife Disks DS/DD *Box of 10* 25
- Disks for IBM-AT (9ETPI) *Box of 10* 47

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- Compuserve Information Service *(includes subscription, manual, 5 hours of connect time, monthly publications)* 19

Source Telecomputing

- The Source *(subscription & manual)* 39

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    2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

1. Follow instructions on the other side

Inverted Back

GbsSlipBack-0018

Back

1. Follow instructions on the other side

cuts, cooperativ

President's Choice *(ages 13 to adult)* $27
Face Maker *(ages 3 to 8)* 23
Kids on Keys *(ages 3 to 9)* 23
Story Machine *(ages 5 to 9)* 23
Fraction Fever *(ages 7 to adult)* 23
Kinder Comp *(ages 3 to 8)* 20
Alphabet Zoo *(ages 3 to 8)* 20
Stone *(requires graphics board)*
My Letters,Numbers,Words *(ages 1 to 5)* 29
Kids Stuff *(ages 3 to 8)* 29
Across the U S A *(ages 5 and up)* 22

GAMES

Blue Chip
Millionaire 39
Tycoon 39
Baron 39
Broderbund
Lode Runner 25
FriendlySoft
FriendlyWare/PC Arcade 35
Hayden Software
Sargon III 35
Infocom
Difficulty levels shown in italics
Seastalker *(junior)* 25
Enchanter *(standard)* 25
the Witness *(standard)* 25
Planetfall *(standard)* 25
Cutthroat *(standard)* 25
Hitchhiker's Guide *(standard)* 25
Zork I *(standard)* 25
Zork II *(advanced)* 29
Zork III *(advanced)* 29
Infidel *(advanced)* 29
Sorcerer *(advanced)* 29
Suspect *(advanced)* 29
Deadline *(expert)* 33
Starcross *(expert)* 33
Suspended *(expert)* 33
Invisiclues (hint booklets) are available for most Infocom games Specify game 7
Microsoft
Flight Simulator 35
Origin Systems
Ultima III 39
PCSoftware
Armchair Quarterback 27
Chess 2001 27
Championship Blackjack 23
Sir-Tech
Wizardry 42
Spectrum Holobyte
GATO 27
Subiogic
Night Mission Pinball 29

HARDWARE

AST Research *(For IBM-PC or XT)*
All AST Boards come with SuperDrive SuperSpool and one year warranty
SixPakPlus 64k upgradeable to 384k with clock calendar serial and parallel ports *(game port optional)* 249
MegaPlus II 64k upgradeable to 256k (or more with MegaPak) with clock calendar and serial port *(parallel, game, or second serial port optional)* $249
MegaPak 128k *(not upgradeable)* 209
MegaPak 256k 339
I/O Plus II with clock calendar and serial port *(parallel, game, or second serial port optional)* 125
Parallel Game or second Serial Port *for any AST board (specify board)* 35
Connectall *connector bracket (PC only)* 19
AST-5251-12 529
AST-5251-11 709
AST-3780 589
Reach Modem *(half card 300/1200 baud internal modem includes Crosstalk XVI)* 389
Advantage 128k upgradeable to 384k with clock calendar, serial and parallel ports *(game port optional)* 399
Amdek
Video 300G monitor *(green)* 139
Video 300A monitor *(amber)* 149
Video 310A monitor *(amber)* 179
Color 600 - RGB monitor 399
Color 700 - RGB monitor 439
Compucable
Plastic Keyboard & Drive Cover Set 17
IBM Mono Screen Enhancement 17
Curtis
ACCESSORIES
PC Pedestal *(for IBM Mono or Color)* 37
PGS or Quadchrome Adapter for above 9
Low Profile Tilt and Swivel Pedestal 37
AD-2 Adapter for Portables 15
System Stand 19
Static Mat 27
CABLES
Extension Cables for IBM Mono Display 33
Keyboard Extension Cable *(3 to 9 feet)* 27
AC Plug Adapter *(any monitor to your PC)* 8
Printer to IBM Cable *(specify printer)* 19
Smartmodem to IBM Cable 19
SURGE SUPPRESSORS
All surge suppressors have an on/off switch
Diamond *(6 outlets)* 33
Emerald *(6 outlets, 6 ft cord)* 43
Sapphire *(3 outlets, EMI/RFI filtered)* 53
Ruby *(6 outlets, EMI/RFI filtered, 6 ft cord)* 63
Epson
All Epson printers have built in graphics capability In addition, the "Plus" printers can print in near letter quality (NLQ) with the addition of the NLQ parallel or serial option
LX-80 *(replaces RX-80 - includes NLQ)* call
RX-100 call
FX-80 Plus call
FX-100 Plus call
JX-80 call
LQ-1500 *(letter quality dot matrix)* call
Printer to IBM Cable (specify printer) 19
Hayes
Smartmodem 300 149
Smartmodem 1200 429

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expires August 31, 1985

HERCULES COMPUTER
Monochrome Graphics Card
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MANAGEMENT SUPPORT

After you determine the best training alternative and justify the cost, you must secure both the support of management and the necessary funding (step 4).

By this time, you've probably gained a sense of where management stands on the issue prior to this step, but now is the time of reckoning. Be prepared with the need statement, costs, and benefits. If you are planning to use a new training media (like interactive video or computer-based training), you may want to have a demonstration available to show the decision makers.

With the plans and approvals behind you, you can begin to develop the training: you'll determine and then review the scope of the program (step 5).

Regardless of the media you decide to use, the scope should include the overall purpose of the training, an audience description, measurable training objectives, an outline of the training topics, time lines for completing milestones, and a list of the resources that may be required.

> The true test of training success is in the final evaluation. Ask all students to complete a questionnaire describing their reactions to the training program.

The individual responsible for developing the training determines the scope, which is then reviewed by those responsible for the success of the training. Reviewers should include managers, users or trainees, PC experts, and training specialists. The mix of experience helps ensure that the training is technically accurate and educationally sound, and meets the students' needs. It also helps secure management's endorsement.

DEVELOPING A DESIGN

Next, you should develop a draft of the training design based on the reactions to the scope (step 6). For computer-based training this design will include paper drafts of screen layouts complete with student input options, screen branching information, and student feedback messages. Video program designs may be as specific as a draft of the dialogue and visual drawings or as general as a detailed outline with visual suggestions. Classroom course designs should include course content outlines, hands-on activities, and visual aids.

The review panel should carefully

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Princeton, NJ 08540
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Bell & Howell Visual Communications Group
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Chicago, IL 60645
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Instruction Systems Development
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Irving, TX 75039-5513
(214) 556-4991
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The Author Plus
Raptor Systems
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List Price: $495
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Interactive Authoring System
McGraw-Hill Training Systems
1221 Avenue of the Americas, 4th Fl.
New York, NY 10020
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The Educator
Spectrum Training Corporation
18 Brown Street
Salem, MA 01970
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study this document to reach an agreement on how the software will look once it is developed (step 7). They should consider such questions as: Will the course be technically accurate? Will the course teach? Are the learning objectives achieved? Careful review at this point saves you costly software changes later.

Some companies like to hold a walkthrough of the design. In effect, each part of the training is presented, discussed, and approved by the course developer and the reviewers.

Barring unforeseen problems with the design, you complete the final training on the basis of comments from the design phase. At this point, each reviewer should participate in the training as a student. While involved in the training, reviewers should consider their own areas of expertise or concern (like PC technical knowledge), but they must also keep in mind the needs of the trainees. Any specific suggestions for changes should be identified at this point.

Once the training is complete, you should test it with a sample group to help iron out any remaining bugs (step 8). Testing may involve gathering student observations and reactions. After successful testing, you can put the training program into widespread use.

If the student population is so small that you can't form a test group, ask one or two trainees not involved in the development process to review the completed training. You'll want all the impartial feedback from them that you can get.

THE FINAL TEST

The true test of training success is in the final evaluation (step 9). Ask all students to complete a questionnaire describing their reactions to the training program. You should also evaluate the student's ability to perform the measurable objectives that were part of the training design. And eventually managers and other supervisors should be able to tell you whether employees under their review got what they needed from the training.

When the PC training you need is not available commercially, follow this step-by-step plan and do it yourself. By designing your own training program, you can be sure to meet your specific needs. ■

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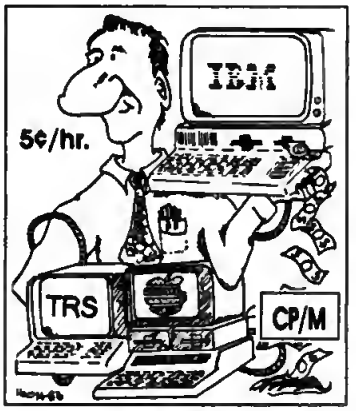

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SURVEYING THE RESOURCES:

A 1-2-3 TRAINING COMPENDIUM

Bedazzled and befuddled by the array of resources available to help you learn Lotus's 1-2-3? PC Magazine takes you on a guided tour of the various 1-2-3 training aids, including books, disk-based tutorials, audio and videotapes, and seminars.

A mind-boggling number of training products are available to help you learn specific software programs. To give you an idea of the scope of the marketplace, *PC* has targeted one piece of software for which many users seek outside training: Lotus's *1-2-3*. Here are 21 reviews of books, disk-based tutorials, audio and videotapes, and seminars that represent the spectrum of *1-2-3* training aids.

HARDCOVER HELP

More than most authors would care to admit, you do judge books by their covers or, at least, by their visible differences. If this were not true, you'd have a hard time choosing a book to teach you *1-2-3*. Of course, if you could spend a few days flipping through your neighborhood bookstore's shelf full of books on *1-2-3*, all of which cost under $25, you'd probably make a wise choice. But, how can you make a competent decision in 10 minutes or less?

In the course of reviewing six books that purport to teach *1-2-3*, I found several cues that you can look for to help you make a good selection while browsing. First, look at size and price. I discovered that the two least-expensive and most lightweight books were also the least helpful, while the two that appeared densest were packed with useful content. By reading the preface, you can tell whether a book claims to be comprehensive or is just a beginner's guide. While I'd probably opt for the former because I believe it's better to learn from a book that will also serve as a reference tool, you may prefer a book that covers not as much, a bit more quickly.

A glance through the book will tell you whether it relies on examples or explanations. Example-oriented books have a lot of step-by-step instructions, and a quick examination of the screen illustrations will

show that the same problems are developed over many pages. Such books rely heavily on your actual manipulation of a sample spreadsheet while they describe what's going on, and so they are hard to use if you don't want to sit at a computer with *1-2-3* while reading them. In other words, they aren't good books if you want to read at home but your computer is at the office. The explanation-oriented books, while they often include a lot of examples, tend to be written in paragraphs of real prose.

Check to see how much the book is oriented to the structure of *1-2-3* itself. Does it introduce commands in order of complexity and describe groups of commands that are related to one another within *1-2-3*? Books with such an orientation, which also tend to be the more comprehensive ones, are useful as long-term references. Other books are more problem-oriented: they explain a problem for which *1-2-3* might be used and then describe all the commands that you can use on that kind of problem, whether or not *1-2-3* considers the commands closely related. This method can be confusing, especially if you go back to the book a month later for a bit of additional information on a feature you haven't yet used.

Finally, one feature that is relatively easy to judge and is extraordinarily important in a training book is its typographical and stylistic conventions. Is it always clear what you are supposed to type in versus what the computer will display? Is there a clear distinction between the words you are supposed to type and the labels of keys you are supposed to strike? In this area, authors should not be creative; they should be consistent.

To judge the quality of the books in some sort of systematic fashion, I asked myself what features of *1-2-3* confuse or confound new users the most. With the help of two professional *1-2-3* trainers, I identified the most-difficult concepts and commands and saw how well each book explained them.

- Memory use. Does the book warn about *1-2-3*'s memory limitations and give any advice on minimizing memory occupied?
- Date manipulation. Does the book clearly distinguish between loading a date into a cell, the way the date is stored in the cell, and the way to format a cell so the date is properly displayed?
- Printing commands and output formatting. Does the book make the function of printer border rows and columns, headers, footers, and setup codes completely clear? Does it adequately describe the relationship between the page size and margins known to *1-2-3*, and the actual physical size of the printer page?
- Horizontal and vertical lookup tables. Does it explain them clearly and describe their limitations?
- The Data Table 1 and Data Table 2 commands. Does it explain these "killer commands" clearly, both as to function and as to when they are appropriate?
- Extraction of records from a database. Does the book clearly explain definition of ranges?
- Macros. How well does it describe the usefulness of macros and the techniques for creating them successfully?

Photograph: Dennis Kitchen

THE CREAM OF THE CROP

Using 1-2-3 and *Lotus 1-2-3 Self-taught* offer the clearest and most-complete descriptions. They are the only books that give serious advice on memory management, mention that lookup tables cannot be used to convert numbers into text equivalents, and describe both step-by-step debugging and auto-execution in conjunction with macros. They also include the best explanations of *1-2-3*'s date handling and record extraction features.

On the easy-to-judge-in-the-bookstore front, *Using 1-2-3* and *Lotus 1-2-3 Self-taught* both list all 50 or so *1-2-3* @ functions in their indexes. They follow the most intelligent and transparent typographical conventions; they clearly distinguish between keystrokes that represent commands, characters to be typed into a spreadsheet, and special keys. Both books are good basic training tools and would serve well as handy reference companions to your *1-2-3* manual.

Using 1-2-3, the oldest of the books covered here, is the only one with extensive references to that prehistoric spreadsheet program, *VisiCalc*. If you are only just now making the *VisiCalc*-to-*1-2-3* conversion, this is without a doubt the best of these books.

The book is organized like *1-2-3* itself and gives full descriptions of commands and functions. The many examples illustrate the topics discussed, but they are not the focus of each discussion. Typographic and style conventions are usually helpful. More than most of the books reviewed here, *Using 1-2-3* draws attention to the limitations of the program, particularly in the database area.

Lotus 1-2-3 Self-taught looks better the longer you study it. At first, it appears somewhat pedantic, but the writing style, if never sparkling, is always clear and respectful of the reader.

Self-taught's typographical conventions are the clearest of any in this collection, although the overall look of the book is unexciting. (Reproductions of graphs, in particular, are poor.) The coherent descriptive text is broken up with numerous "beware" and "how to" passages. Like *Using 1-2-3*, *Self-taught* is structured like the program itself and progresses from elementary to complex commands in a clear and logical fashion.

Self-taught covers most of *1-2-3*'s most difficult concepts and commands with admirable lucidity. However, its description of data tables is a little weak, and although its basic description of macros is fine, it is in the final chapter of the book and reads like an afterthought.

THE SECOND STRING

The *Osborne/McGraw-Hill Guide to Using 1-2-3* and *The ABCs of Lotus 1-2-3* both expect you to bang on the keyboard as you learn. Neither book would be much use if you were not prepared to follow their examples in some detail. Both look, at a glance, like manuals or textbooks. They are not easy to read; rather, they are meant to be used. The *ABCs* publisher made its book even easier to use by making it spiral-bound, so it lies flat when it is opened; this, presumably, explains why it costs more than any of the other five books.

> Lotus 1-2-3 Self-taught looks better the longer you study it. At first, it appears somewhat pedantic, but the writing style, if never sparkling, is always clear.

Neither book attempts to be comprehensive—the *Osborne/McGraw-Hill Guide* only covers 17 of the 50 @ functions and *ABCs* explains even fewer. In a section-by-section comparison, these two books lack uniformity; they often, but certainly not always, offer very good descriptions. Either one would make a good learning tool to be used alongside the computer, but neither is likely to be especially useful as a long-time reference book.

The *Osborne/McGraw-Hill Guide* is clear and well-written and is conversational without being chatty. The book's typographical conventions are good. And it claims to be "wholly dedicated to the learn-by-example approach," although it doesn't carry this approach to extremes. It mixes extensive at-the-keyboard sample problems with explanatory text, and even though you would learn more by working right through the examples, you can easily check on a command or grasp a new feature of the program by reading the text.

The book covers the major subject areas quite well, but, in a couple of cases, the explanations are a bit hampered by the author's insistence on relating them to the sample problem at hand.

The *Osborne/McGraw-Hill Guide* pursues the subject of building large systems with *1-2-3* much further than any of the other books and includes chapters on creat-

1-2-3 BOOKS

Using 1-2-3
Geoffrey T. LeBlond and Douglas Ford Cobb
Que Corp.
7999 Knue Rd., #202
Indianapolis, IN 46250
(317) 842-7162
Copyright: 1983
Cover Price: $17.95
ISBN: 0-88022-045-7
CIRCLE 668 ON READER SERVICE CARD

Lotus 1-2-3 Self-taught on the IBM PC
Ira Krakow
Brady Communications Co., Inc
Rte. 197
Bowie, MD 20715
(301) 262-6300
Copyright: 1985
Cover Price: $15.95
ISBN: 0-89303-628-5
CIRCLE 667 ON READER SERVICE CARD

Osborne/McGraw-Hill Guide to Using Lotus 1-2-3
Edward M. Baras
McGraw-Hill Book Co.
Princeton Rd.
Highlstown, NJ 08520
(609) 426-5254
Copyright: 1984
Cover Price: $16.95
ISBN: 0-007-881123
CIRCLE 665 ON READER SERVICE CARD

The ABCs of Lotus 1-2-3
Bill Kling
Scott, Foresman, and Co.
1900 E. Lake Ave.
Glenview, IL 60025
(312) 729-3000
Copyright: 1985
Cover Price: $18.95
ISBN: 0-673-15996-5
CIRCLE 664 ON READER SERVICE CARD

Working with 1-2-3 on the IBM PC and Compatibles
Richard Startz
Harper & Row
10 E. 53d St.
New York, NY 10022
Copyright: 1985
Cover Price: $14.95
ISBN: 0-06-046426-7
CIRCLE 663 ON READER SERVICE CARD

1-2-3 Go!
Julie E. Bingham
Addison-Wesley Publishing Co.
Jacob Way
Reading, MA 01867
(617) 944-3700
Copyright: 1984
Cover Price: $14.95
ISBN: 0-201-13047-5
CIRCLE 662 ON READER SERVICE CARD

ing database input and output forms using *1-2-3* macros, building a stock-tracking system, and using *1-2-3* for financial functions and sensitivity analysis.

The *ABCs*'s subtitle, *A Step-by-Step Approach*, is an accurate description. It is also the book's main flaw: If you don't want to march in lock-step with the book, its usefulness plummets. Examples are everything in this type of book, and unless you set them up yourself, you will find it difficult to learn much of anything.

The ABCs of Lotus 1-2-3's subtitle, "A Step-by-Step Approach," is an accurate description. It is also the book's main flaw: If you don't want to march in lock-step with the book, its usefulness plummets. Unless you set up the examples yourself, you will find it difficult to learn much of anything.

The book also has poor typographic conventions. *1-2-3*'s command structure allows you to give such a command as Worksheet Global Recalculation Manual by simply typing the first letter of each word: WGRM. Unfortunately, that's all *ABCs* tells you to do. When every other book I reviewed instructs you to issue such a command, it spells out the whole thing and uses typography, such as boldface or italic, to indicate that only the initials are required—an approach that takes up more space but for a good cause—it's much more meaningful.

ABCs does not adequately explain date and data table features. In fact, its description of the \0 (auto-execute) macro is incomprehensible. And its suggestion that if you really want to use macros for programming, you should read some books on BASIC is a cop-out. *ABCs* covers the complexities of printing at least as well as any other book, and it is the only one with extensive information on how to configure *1-2-3* to various printers and plotters. In general, *ABCs* is better equipped to tell you how to do things than to explain why you might want to do them.

TWO LIGHTWEIGHTS

Working with 1-2-3 on the IBM PC and Compatibles and *1-2-3 Go!* are the least expensive, shortest, and least useful of the books I reviewed. Both attempt to organically describe *1-2-3:* they take problems and quite simply discuss how you might tackle them with *1-2-3*. Consequently, they are organized rather less clearly than any of the others. Both ask you to set up and manipulate a variety of *1-2-3* models as you read, but, to a greater extent than with the previous pair, you can get away with not doing so.

At first glance, *Working with 1-2-3* looks promising. Because the author's style is lively and the table of contents looks good, you will be inclined to believe that perhaps this stuff really can be explained in only half as many pages as most books give it. But the more you look at *Working with 1-2-3*, the less you'll like it. After a few chapters, even its lively style becomes pretty annoying.

Overall, the book is an adequate introduction to some of *1-2-3*'s abilities. Unlike many other books, it considers database and spreadsheet features to be tightly interrelated and presents examples that illustrate the connection. Its description of Data Table 1 is good. But it covers record extraction, horizontal and vertical lookup, and macros in a cursory fashion.

Working with 1-2-3 is a lot easier to read away from a computer than most of the others. But the book doesn't cover enough areas in detail for you to learn about *1-2-3* from it. It makes no mention of memory management or date functions, except for @TODAY. In addition, it inadequately covers printing in a single paragraph. And, finally, its core section—a long chapter entitled "The Artistic Approach to Spreadsheet Creation"—promises some guidance on how to lay out and design complex spreadsheets but doesn't deliver.

1-2-3 Go! covers the basics of *1-2-3*, and, like *Working with 1-2-3*, takes a more integrated view of the role of database and spreadsheet functions than do most of the other books. It is worth buying only if none of the other books are available.

Horizontal and vertical lookup tables are nowhere to be found. The book covers print commands in a cursory two pages and doesn't describe any of the /X macro commands, except for /XM, which is not much use without the others. However, I will admit that it is possible I missed some of the features of the book, and you may too, especially since its index is the shortest and least comprehensive of them all.

1-2-3 Go! never raises memory management issues, and it sets up the sample spreadsheets in an unnecessarily memory-wasting fashion. Its typographical and style conventions are poorly thought-out. And its example screens were produced by dumping screens to a low-quality dot-matrix printer—not an adequate method for reproducing them in a book.

Some books can do an admirable job of teaching the use of a complex program like *1-2-3*. But, just as in any other field, the quality of the current crop is uneven. The good news is that none of them cost so much that you will sorely regret the purchase, and none of them will take you seriously astray.—**John Helliwell**

John Helliwell, a computer consultant and writer, is based in Toronto.

DISK-BASED TRAINING

You would think that the transparent command structure of *1-2-3*, its extensive help screens, and the inclusion of an on-screen tutorial in its package would have discouraged third-party vendors from creating disk-based *1-2-3* tutorials. Well, you'd be wrong. The disk-based tutorial market for *1-2-3* is both large and thriving.

Disk-based training programs might

seem like the ideal way to learn a new software package for many reasons. They are in the same medium as the package itself; they're state of the art, menu driven, interactive, and all the other buzzwords; and because most of them attempt to simulate the real program, your graduation to the real thing should be a snap.

Yet disk-based tutorials have severe drawbacks. The simple act of transferring training text from a book to a screen doesn't make the material any more comprehensible if it isn't easy to understand in the first place. The programs must be interactive, preferably instructing you to enter the keystrokes that you would use when actually working with *1-2-3*. But since the training programs expect specific keystrokes to be executed, they usually tolerate no deviation from the instructions. The field of on-line tutorials is still only in its infancy.

Most disk-based training programs for *1-2-3* attempt to mimic an actual *1-2-3* session—an advantage of disk tutorials that a mere book cannot approach. Graduates of these training courses should be able to jump right into the real thing and say, "Hey, I've been here before." As important as the visuals is the feel of the program: the relationship of screen responses to keys being pressed.

Lotus's own *Tutor* program excels at *1-2-3* simulation, mainly because it's not a simulation at all. The program is actually a somewhat modified version of the real *1-2-3*. However, unlike *1-2-3*, *Tutor* loses keystrokes if you type too fast. The program apparently clears the keyboard buffer after it accepts each keystroke.

SPLIT-SCREEN APPROACH

Similar to *Tutor*, the Cdex *Advanced Training for the Lotus 1-2-3 Program*, the ATI *Teach Yourself Lotus 1-2-3*, and the ASI *Productive Application of Lotus 1-2-3* all use the split-screen approach—that is, they have a simulated worksheet on top and tutorial information and keystroke instructions on the bottom. If more text is required, the tutorial takes over the full screen.

These three tutorials aren't very successful in simulating the feel and rhythm of the real thing. None of the training programs, except for *Tutor*, comes anywhere close to the speed of *1-2-3* or can show the worksheet actually scrolling, although the ASI program does attempt it and is almost successful.

Cdex's *Teach Yourself Lotus 1-2-3* looks almost exactly like *1-2-3* (except that it's entirely white on black with a color display) and, unlike the others, uses the whole screen for the simulated worksheet by putting its instructions in boxes overlaying the worksheet wherever convenient. But the feel of *1-2-3* is largely absent. For instance, when the tutorial asks you to press the left-arrow key four times, the cursor doesn't actually move until you press all four keystrokes. *Teach Yourself* is a compiled BASIC program and is painfully slow and bulky. Just about every keystroke generates another disk access. The screen is frequently erased and redrawn. Although the screen has an uncanny resemblance to the actual *1-2-3* spreadsheet, it doesn't behave much like it.

The Houghton-Mifflin *DoMore with Lotus 1-2-3* doesn't even attempt to simulate *1-2-3*. Although pieces of a spreadsheet are occasionally reproduced on the screen to illustrate the lessons, you can't actually do anything with them. When the tutorial explains how to select a range, it does so well, but all you do is press Enter to go to the next screen. Yet *DoMore* is the fastest of the lot. Aside from *Tutor*, it is the only program I reviewed that writes directly to the display memory and gives instant screen updates.

DISK FANTASIES

Imagine a training program that tells you how to do something, lets you try it out, and then explains why you ran into problems. It also gives alternative methods and allows you to use whichever one you choose. At some point, you'd be more or less on your own to move around freely and experiment, but the training program would figure out what you were trying to do and give you helpful suggestions along the way.

Photograph: Dennis Kitchen

Unfortunately none of these programs live up to this fantasy. One of the major drawbacks of disk-based tutorials is their lack of flexibility. If the tutorial tells you to move from cell A1 to C2 by pressing the right-arrow key twice and the down-arrow key once, that's what you do. Don't even try using the F5 (GOTO) key unless the program says to use that instead of the cursor keys.

I often found that in the middle of a complex procedure, such as setting up a Data Table, I wanted to take a little cruise around the spreadsheet and look at the formulas in certain cells. None of these tutorials allow free movement within the spreadsheet.

Tutor demonstrates how the help screens work, for instance, but the F1 key is only active during this demonstration. In fact, the *1-2-3* help file on the tutorial disk contains only those screens used during this brief demonstration.

The *DoMore* program is particularly annoying when it comes to ranges. Although *1-2-3* requires only one period to separate the two cells of a range definition, the *DoMore* quizzes request two periods before they will accept your answer.

ASI's *Productive Application of Lotus 1-2-3* advances slightly beyond the usual keyboard restrictions. At some points in the tutorial, the instructions say to use either the pointing method or the typing method for specifying a range. But this apparent freedom is illusory. The program simply accepts two altemate series of keystrokes, and any deviation from what the program expects for these two altemates produces a beep and an error message.

JUST BROWSING

When you learn from a manual, you can skip around from topic to topic with relative ease. You just stick something (a finger will do) in the pages, flip to the index or table of contents, read another few pages, and then come back. Disk training programs are usually not so amenable. One exception to the general rule is *DoMore with Lotus 1-2-3*. It has 20 "chapters" in the training program, and at any time, you can leave a chapter, go to the index, and begin another chapter. Chapters always begin at the beginning, but function keys allow paging back and forth through the chapters.

The *DoMore* program is somewhat tree-structured. At various points, you can either receive a detailed treatment of a topic or skip to the next topic. The program sometimes uses a function key to display more information about particular items. If you already know what ASCII means, for instance, you don't have to read an explanation of it.

The *DoMore* program also includes a nice personalized bookmark that records the screen where you exit the training program so the next time you can pick up where you left off, even in the middle of a chapter. The system also records bookmarks for more than one program user.

At the other extreme is the *Tutor* program. You may page back and forth through the screens of each lesson with the PgUp and PgDn keys, but the paging back movement is abominable and gets worse as you go further into each lesson. For instance, it takes 1 full minute to page back from the last screen of lesson D to the previous screen. This may be an extreme example because lesson D includes some Data Table calculations, but it is still astonishing.

Why this long delay? The actual *1-2-3* worksheet is being modified in the course of each lesson, and paging back to a previous screen requires the worksheet to be entirely reconstructed from the beginning of the lesson. This is inherent in the structure of the Lotus tutorial, and after studying the Lotus TUT files and how they worked, I don't see any way around this problem. An actual worksheet is being modified during the screens and the only way to "unmodify" it (aside from saving all versions of it along the way) is to start over again from the beginning.

The DoMore program is somewhat tree-structured. At various points, you can either receive a detailed treatment of a topic or skip to the next one.

In choosing a disk-based tutorial, one of your primary considerations should be its appropriateness for your level of experience. The order in which topics are introduced is particularly important: a program that throws complex procedures at you before explaining the basics will lose beginners immediately. None of these programs cover the entire breadth of *1-2-3*. If you're looking for depth, only one source is available—the *1-2-3* User's Manual. Although some of these disk trainers attempt to cover a lot of different topics, they are again deficient in the depth they can explore.

Cdex's *Teach Yourself Lotus 1-2-3* is probably the best program for absolute beginners. It explains the early material in a meaningful order, slowing down when it has to for breathers and fuller discussion. It is, however, the slowest program of the lot, and it covers the least material because it is geared toward beginners. However, it covers this introductory material very well. After you complete the disk, you'll be able to enter labels, numbers, and formulas, print and save worksheets, and do some formatting and prettifying, but that's about it.

The Cdex *Advanced Training for the Lotus 1-2-3 Program* is not a simple continuation of the *Teach Yourself* program. *Teach Yourself* was programmed by Deltak Microsystems, and *Advanced Training* comes straight from Cdex. The latter program is slicker and more professional looking but lacks the breezy informality of the former. The material, including treatment of keyboard macros, in *Advanced Training* is quite astonishing; it even covers the programming-like macros for using GOTOs and subroutine calls, printing messages, and creating user menus.

WHAT-IF ANALYSIS

The *Tutor* program also takes a good approach to covering the material. The first command to be introduced is /File Save at the end of the first of six lessons. The *Tutor* introduces no topic before its time and shows each new topic as a solution to a problem. Does a label begin with a number? Label prefixes are introduced. Did you misspell a label? Fix it with the F2 (Edit) key. Do you want to save typing time? Try the Copy command. Does Copy not work correctly sometimes? You need an absolute reference. Will a 20-year sum be a long formula? Try the @SUM function. You can't see the whole worksheet on the screen? Split it and freeze the titles. Are you getting tired trying too many "what ifs"? Time for a data table.

ATI's *Teach Yourself Lotus 1-2-3* takes an approach that is genuinely crazed. Before you even enter any labels or text in its make-believe spreadsheet, it requires you to change the width of column A. After a

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few titles are entered, it discusses locking the titles, but this point comes even before scrolling is explained. After employee data is entered, the employees are sorted (we're still early in the training here), and the all-important concept of a *1-2-3* range is glossed right over. Although the ATI program cannot simulate scrolling the worksheet, it discusses synchronized and unsynchronized windows. Often the program carries you through a whole wealth of instructions with only a dim explanation of its goal.

The ATI package continues with an extensive demonstration of creating a data table. However, its data table example obscures the whole point of what a data table is supposed to do. In fact, the calculation it illustrates does not need a data table at all.

ASI's *Productive Application of Lotus 1-2-3* covers most of the basic material; however, it dies of exhaustion soon after printing and saving files. It attempts to cover what-if analysis but does so only by replacing values on the spreadsheet. It doesn't touch /Data functions but takes a crack at macros—unfortunately, it's a very sketchy and incomplete explanation. The tutorial starts out fine with worksheet navigation but then introduces the command hierarchy and *1-2-3* error messages in the second lesson—a progression that spreadsheet neophytes are sure to find confusing. It eventually straightens itself out and begins covering material in a reasonable manner, but I'm afraid that may be too late for some.

ASI's Productive Application of Lotus 1-2-3 covers most of the basic material; however, it dies of exhaustion soon after printing and saving files.

DoMore with Lotus 1-2-3 suffers from its inability to imitate *1-2-3* and has to interrupt a generally good order of topics to explain why things are different in this program than in the real *1-2-3* spreadsheet. Although it is nicely laid out and makes good use of color, it is essentially a screen-flipper with occasional questions and quizzes. It provides various exercises for you to try out with the real *1-2-3* program and tells you to print the screen to get a copy. But these screens contain a lot of graphics characters that will not print on all printers and some of which will not even print on the IBM Graphics Printer.

The *DoMore* program covers more functions than any of the others, even including @IF, @LOOKUP, and @CHOOSE, but it goes so quickly that much of it is incomprehensible. It doesn't touch /Data and /Graph commands but has one screen on keyboard macros that is essentially a "this stuff is possible also" display.

Except for a brief demonstration in the *Tutor*, none of the programs have any substantial information on the single most important key in *1-2-3*—the F1 (help) key. The help screens in *1-2-3* are truly one of the most incredible features of this program; the fact that even long-time users of *1-2-3* don't automatically go for help when perplexed about something indicates that the F1 key has not been given the emphasis it deserves.

None of these programs actually print anything on a printer, although they all go through the motions. Surprisingly, all of the tutorials, except for *DoMore*, cover graphics, but only the ATI program works

1-2-3 DISK-BASED TUTORIALS

Teach Yourself Lotus 1-2-3
(two-volume edition)
American Training International, Inc.
12638 Beatric St.
Los Angeles, CA 90066
(800) 421-4827
List Price: $75
Requires: 128K RAM, one disk drive, DOS 1.1 or above, color/graphics display for graphics.
CIRCLE 660 ON READER SERVICE CARD

Productive Application of Lotus 1-2-3
Advanced Systems, Inc.
155 E. Algonquin Rd.
Arlington Heights, IL 60005
(800) 238-2625
List Price: $95
Requires: 128K RAM, one disk drive, DOS 1.1 or above, color/graphics display for graphics.
CIRCLE 661 ON READER SERVICE CARD

DoMore with Lotus 1-2-3
Houghton Mifflin Software
One Beacon St.
Boston, MA 02108
(617) 725-5527
List Price: $75
Requires: 96K RAM, one disk drive, DOS 1.1 or above.
CIRCLE 658 ON READER SERVICE CARD

Tutor (included with *1-2-3*)
Lotus Development Corp.
55 Cambridge Pkwy.
Cambridge, MA 02142
(617) 492-7171
List Price: $495 (for complete *1-2-3* package)
Requires: 256K RAM, two disk drives, DOS 1.1 or above, color/graphics display for graphics.
CIRCLE 657 ON READER SERVICE CARD

Teach Yourself Lotus 1-2-3 on the IBM PC and ***Advanced Training for the Lotus 1-2-3 Program***
Cdex Corporation International
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San Jose, CA 95131-1899
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with the standard IBM adapter and monochrome display because it mimics graphs using block characters instead of dots. However, the ATI program doesn't warn you that normal *1-2-3* graphics don't show up on the monochrome display.

YES, BUT CAN IT TEACH?

Of the six *1-2-3* tutorials, only the *Tutor* comes with a substantial manual. The other five manuals are small reference guides for using *1-2-3* rather than supplements to the tutorial. The skimpiness of these manuals indicates that the companies seriously treat their disk tutorials as nearly standalone systems. Do they really expect users to get along with just these tutorials and completely ignore the *1-2-3* manual? No chance.

None of these on-line tutorials really sparkle by themselves as the solution. You'll probably have to use more than one if you would like to learn *1-2-3* entirely from disks—perhaps, starting off with the Cdex *Teach Yourself* course and then moving on to the *Tutor*.

Overall, the best single disk tutorial is *Tutor*. I know that $495 may seem steep for an on-line tutorial, but you get a terrific spreadsheet program called *1-2-3* along with it. The manual isn't bad either.

—Charles Petzold

Charles Petzold is an office automation coordinator for a New York City insurance company and is a frequent contributor to PC Magazine.

VCR TRAINING TACTICS

Several months ago you purchased *1-2-3*, and you've been wrestling with it ever since. You don't have time to attend a seminar, you're uncomfortable with the restrictions of disk-based tutorials, and you're tired of reading books. Why not switch on your VCR, sit back in your chair, and watch a PC video on *1-2-3*?

Audio cassettes and videotape training for personal computer users may be the brightest stars on the training horizon. Reviewed here are two audio cassettes (from FlipTrack Learning Systems and Total Learning Systems) and three videotapes (by Anderson Soft-Teach, Arthur Young Business Systems, and Learn-PC Video), designed to teach *1-2-3*.

All the tapes are designed to be used while you have *1-2-3* running on your PC. Interested in a particular feature half way through the tape and want to explore it further? Just stop the tape, save your file so you can pick up where you left off, and try anything you like. Incidentally, this freedom also permits you to make errors more easily than does the closely controlled environment of computer-based training—nothing confirms the correctness of your keystrokes. But, then, you can always use the rewind button.

Using an audio tape is similar to getting hands-on instruction from a teacher who is standing behind you and is issuing instructions while you key in your data. However, because you don't really have someone watching over you, you must be careful to follow each keystroke given by the tape's announcer.

AUDIO CASSETTES

Using an audio tape is similar to getting hands-on instruction from a teacher who is standing behind you and is issuing instructions while you key in your data and watch your monitor. However, because you don't really have someone watching over you, you must be careful to follow each keystroke given by the tape's announcer. For example, one missed instruction to press the PgDn key prior to an instruction to enter a formula on the worksheet can put a formula in cell A20 that actually should be in cell A40.

FlipTrack Learning Systems offers a stunning 8 hours of tapes, entitled *How to Use Lotus 1-2-3*, that explain more features of *1-2-3* (and in more detail) than any of the other audio cassettes or videotapes that are reviewed here. FlipTrack takes its company name from a unique feature: at key junctures in the course, the announcer offers you the option to turn to the "FlipTrack" side of the tape for reinforcing exercises, advanced instruction, or quizzes on the subject you have just completed. For example, at the end of a lesson on building formulas, the FlipTrack side offers such topics as exponentiation and use of parentheses to control order of precedence.

If you elect to turn to the FlipTrack side, you are instructed to set your tape player's counter to zero before listening to the FlipTrack material. When the FlipTrack lesson terminates, you rewind the tape until the counter reaches zero, turn it back to the original side, and pick up where you left off with the regular program. FlipTrack says this patented branching feature is exclusive to its products.

Total Learning Systems's *TLS Tutor for 1-2-3*, a 90-minute tape, doesn't attempt to be nearly as comprehensive as FlipTrack's audio cassette or the longer videos. The tape begins with a good introduction and then helps you install the *1-2-3* disk into your computer and format a data disk. After an admirable start, however, *TLS Tutor* runs awry.

Although the tape is brief, it lacks a central example to introduce the skills being taught. Unfortunately, when the tape does develop an example, such as a tax-planning model, it implements it poorly. The announcer instructs you to type the model's formulas on the worksheet prior to giving you the data to which these formulas will refer, robbing you of any understanding of your work as you perform it. Furthermore, the example employs an advanced *1-2-3* formula (nested @VLOOKUP functions) that will probably set a novice's head spinning.

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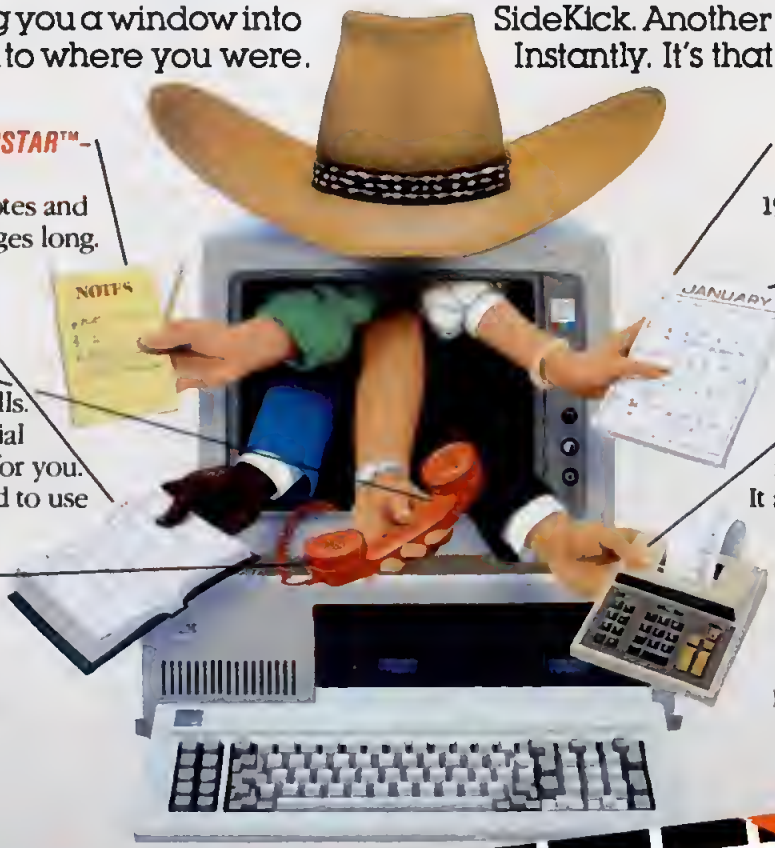

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GETTING THE BUGS OUT

Because most people use audio tapes in the self-study mode that offers no video feedback to confirm the correctness of their worksheet operations, it's especially important that audio tapes be error free. For instance, page 8 of FlipTrack's *How to Use Lotus 1-2-3 Lesson Summary* handbook instructs you to see section on "Preparing Lotus for Use" in the *1-2-3* user's guide—such a section doesn't exist in my *1-2-3* manual (Version 1A). Although the *1-2-3* manual does have a section describing how to handle the operation in question, it is listed under a different section title than the one in the FlipTrack reference. In all fairness, however, that was one of only a few problems I found in this otherwise excellent program.

TLS Tutor suffers from several instances of omitted keystroke instructions—notably in the printing lesson. In the first such instance, you are instructed to select Go to print a worksheet, and *1-2-3* responds by beeping instead of printing. Why? The tape neglects to tell you to specify a range (area on the worksheet) to print—a *1-2-3* requirement. In the next exercise, the instructor does tell you to select the Range command but fails to mention the need to anchor the pointer (used to specify the beginning of a range) prior to specifying that range.

HELP FROM MANUALS

What if you forget something you learned on the tape and didn't make a note of it? FlipTrack provides a 63-page lesson summary to accompany its tape. You cannot use this booklet to reproduce the exercises created with the tape because it lacks the formulas you need to build the models. However, it does contain a four-and-a-half-page index so that you can use it to look up any commands you may have forgotten.

Just to experiment, I checked the @SUM and the Data Table commands. The information on @SUM was sufficient to allow you to relearn it without having to use the tape again. However, the same check on the Data Table commands yields the opposite result—inadequate explanation in the manual will force you to relocate the segment on data tables on the tape in order to refresh your memory.

TLS Tutor provides no written reference. Instead, the tape suggests you use the *1-2-3* reference manual. This is not a bad suggestion because the *1-2-3* manual has a great deal of useful information, but it should not be left there. Two features that no audio or videotape I reviewed provide are an introduction to the manual (particularly the special indexes and appendixes) or any cross references between their own documentation and the *1-2-3* manual. In fact, only FlipTrack bothered to demonstrate the usefulness of the *1-2-3* encyclopedic on-line help system.

> The visual orientation of videotape makes the style employed in each presentation a much stronger factor here than in any other medium.

SEEING IS BELIEVING

According to Charlotte Hofmann, a consultant who has used videotapes from Anderson Soft-Teach to train personnel in both the United States and France, videotapes succeed for the same reason *1-2-3* itself does: they are highly visual.

All three videotapes I reviewed provide clear, high-quality instruction and will be valuable tools for either novices learning *1-2-3* or moderately experienced users exploring new functions. The differences among them involve instructional style, depth of *1-2-3* coverage, use of other materials (such as manuals and disks), and price. All the tapes are available in VHS, Beta, and Umatic (3/4-inch) formats.

THE ELEMENTS OF STYLE

The visual orientation of videotape makes the style employed in each presentation a much stronger factor here than in any other medium. For example, the Anderson Soft-Teach tapes adopt a conversational approach. As the viewer, you experience the course somewhat vicariously—looking on while a consultant teaches the sales manager of an office products company about *1-2-3*. The manager plays devil's advocate and expresses the concerns of a novice. Moreover, it's educational as well as reassuring to watch another person asking questions and learning the same program as you are.

The two Soft-Teach tapes are relatively short (about 37 minutes each) and give a brief overview of *1-2-3*. They lightly cover each major area of the program, including macros. For example, the instruction on data management focuses on the Data Sort commands. It only mentions the powerful Data Query commands (used to locate information in a *1-2-3* database and create reports with it); no instruction is provided. To their credit, the tape's designers were very explicit about this type of format and encourage you to use the information you have learned as a starting point to explore the other functions of *1-2-3*.

Arthur Young's Lotus 1-2-3 Self-teaching Video Course (from the Big Eight accounting firm, Arthur Young Business Systems) evokes a classical mood that's well suited to its corporate roots: an English-accented moderator speaks in a measured, even-toned voice delivering lessons terminated by flourishes of music reminiscent of "Masterpiece Theater." And the tape succeeds because there's substance beneath the style.

At just over 3 hours, it is the longest, most in-depth videotape, though it's not the most expensive. It comes with a comprehensive manual and a disk containing preconfigured worksheet files for exercises. The extra length of the tape allows it to go beyond command skills and include a valuable segment on proper controls for spreadsheet applications, such as preliminary assessment, planning, structuring, testing, archiving, and documenting an application.

Sitting down to learn a new program can bring out latent narcolepsy even in the most dedicated students, but the up-tempo pace and "60-Minutes"-like punch of Learn-PC Video's *Introduction to Lotus 1-2-3* will keep you wide awake. Its instruc-

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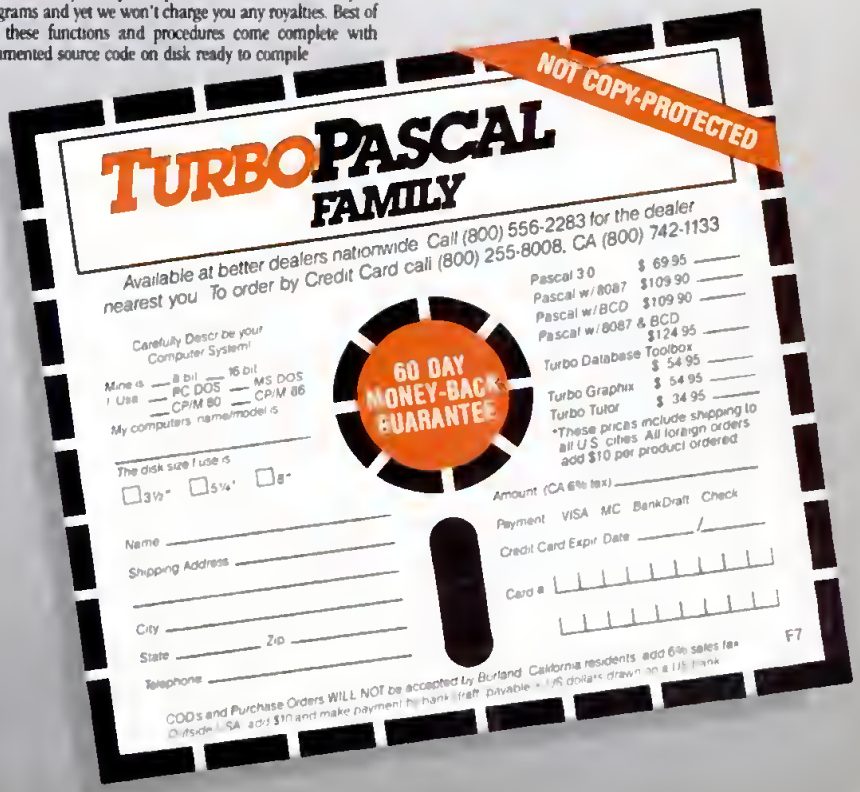

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How, she asks, can we get a crystal ball to forecast what fantastic promotions and specials our suppliers are going to offer from now to the date ***this ad gets to the newsstand over two months from today?***

Well, we decided that she has a good point. While we'll still keep getting our grey hairs and ulcers from last minute revisions, we will start publishing this notice and ask our readers to make a simple check. Look at any four back issues of this magazine ***(yes we're in every one)*** and track the prices on the most popular products. ***You will see that many drop with every issue.*** Most of these price changes were instituted well before the issue was printed and ***our members always pay the lower price.*** This should prove that this notice is much more than hype.

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Digital Research *CP/M-86*	23.00*
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Digital Research *Gem Desktop*	99.00*
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▶ 64K Dynamic Ram Chips [illegible]	[illegible]
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CIRCLE 207 ON READER SERVICE CARD

tor possesses the purposeful, polished presence of a network news anchor. The tape punctuates explanations of *1-2-3* operations and on-screen instruction with full-screen graphics to emphasize and summarize key points. It runs for just under 2½ hours and includes a reference manual and a disk of preconfigured worksheets.

DIRTY LAUNDRY

Lest you think that these tapes are the wunderkind of PC education, you should know about some of their bloopers. Two packages, *TLS Tutor* and Learn-PC Video, adopt terms that are not included in the *1-2-3* manual, in effect creating their own names for *1-2-3* operations. Learn-PC Video calls the "period" key the "until" key when it's used to establish the corner of a range (*1-2-3* terms this operation "anchoring the pointer"). This term is useful as long as you operate within the context of the training program, but when you consult the *1-2-3* manual for more information on the "until" key, you won't find any.

Anderson Soft-Teach is one of only two programs here to introduce *1-2-3*'s powerful File Combine commands that are used to consolidate worksheets. However, amid its enthusiasm for the benefits of this operation, the tape gives no warning of its corresponding liabilities. When the program executes File Combine commands, the position of *1-2-3*'s cell pointer determines the position of the incoming data on the worksheet. With the cell pointer incorrectly positioned, this operation can turn your worksheet into alphabet soup.

> TLS Tutor and Learn-PC Video adopt terms that are not included in the 1-2-3 manual; in effect the programs create their own names for 1-2-3 operations.

Despite their overall effectiveness, both the Learn-PC and Arthur Young tapes fell victim to a similar technical error. In the segment on Data Query commands, these tapes instruct you to specify an Output Range (to receive reports from your *1-2-3* database) in a manner that could easily result in lost data.

1-2-3 allows you to specify output ranges, including just the field names of each database field in your report, or include the number of rows beneath those field names to which you wish to restrict the output range. Both tapes mention only the former approach but fail to point out that *1-2-3* will automatically erase the entire column beneath each field name prior to creating your report. If there are any other entries between those field names and the bottom row of the worksheet, *1-2-3* will also erase them without warning (the latter method of restricting the output range to certain rows avoids this problem). While the Arthur Young manual mentions the problem, it deserves much more prominent attention.

THE RIGHT TOOL?

Despite occasional lapses in instructional integrity, all three videotapes are very effective tools if, of course, they are used appropriately. The secret to success with both audio and videotape training lies in understanding precisely what they will and won't do for you.

None of the *1-2-3* tapes are meant to deal with the challenges of DOS. Nor do they address the wide variations in hard-

1-2-3 AUDIO/VIDEOTAPES

Lotus 1-2-3: An Introduction to the Integrated Spreadsheet* and *Lotus 1-2-3: Advanced Features
(video cassettes)
Anderson Soft-Teach
2674 N. First St., #100
San Jose, CA 95134
(408) 434-0100
List Price: $195 per cassette; additional manuals: 1–10, $5 each, 11–, $3.50
Length: 37 minutes each
CIRCLE 654 ON READER SERVICE CARD

TLS Tutor for Lotus 1-2-3
(audio cassette)
Total Learning Systems, Inc
2005 W. Cypress Creek Rd., #4
Ft. Lauderdale, FL 33309
(305) 771-2100
List Price: $29.95
Length: 90 minutes
CIRCLE 656 ON READER SERVICE CARD

How to Use Lotus 1-2-3
(audio cassettes)
FlipTrack Learning Systems
999 Main St., #200
Glen Ellyn, IL 60137
(800) 222-3547
(312) 790-1117 (in Ill.)
List Price: $75
Length: 8 hours
CIRCE 655 ON READER SERVICE CARD

Introduction to Lotus 1-2-3
(video cassette)
Learn-PC Video Systems
7430 W. 27th St.
Minneapolis, MN 55426
(800) 532-7672
List Price: $495; additional manuals and disks, $15 per set.
Length: 2 hours, 23 minutes
CIRCLE 653 ON READER SERVICE CARD

Arthur Young's Lotus 1-2-3 Self-Teaching Video Course
(video cassette)
Arthur Young Business Systems
1111 Summer St.
Stamford, CT 06905
(800) 543-3450
List Price: $399, additional manuals, $55 (manual and diskette, $75)
Length: 3 hours, 9 minutes
CIRCLE 652 ON READER SERVICE CARD

Note: Video cassettes are available in either VHS, Beta, or Umatic (¾") formats. Prices may be higher for Umatic.

ware that affect the way you use *1-2-3* (there are several places where XT users will find themselves confused by instructions pertaining only to users of dual-floppy systems) or cover the entire range of available commands (no one covered the commands that enable you to maintain a library of graph settings within your worksheet).

For these reasons, trainers point out that it's important to properly prepare students before turning them over to a videotape or audio cassette, and a number of companies use videotapes in conjunction with a live trainer to meld the advantages of both methods. Used independently of a trainer, you should regard a tape as a starting point from which to expand your skills.

—Richard W. Riddington, Jr.

Richard W. Riddington, Jr., is a freelance writer and consultant for Soft Industries in Southington, Connecticut.

FORMAL TRAINING

Most people have an instinctive reaction when faced with the prospect of learning a new skill: to go take a course. It's an understandable response. After all, didn't you spend 12 to 16 of your formative years sitting in classrooms?

The large number of different seminars available for *1-2-3* becomes even more impressive when you realize that nearly two-thirds of these are regional offerings, as opposed to nationally marketed programs. Considering how frequently these courses are offered, it appears that many *1-2-3* users are responding to the instinctive call of the classroom.

WHERE THE COURSES ARE

Most nationally marketed seminars are 1 or 2 day programs sponsored by a nonprofit educational organization or the continuing education division of a university. You can find similar offerings at many local colleges and universities. These local offerings can take the form of either a traditional semester course or a shorter, more-intense program. Many community colleges respond to the needs of working students by offering their courses during evening and weekend sessions.

Private-sector opportunities abound also. Many computer stores are discovering that customers need training on many programs and have made an effort to meet these needs by holding frequent training sessions for the more popular programs. In addition, centers that specialize in computer training—often their only service—offer courses at their own facility or will send instructors to your company for a private training session.

Different levels of *1-2-3* training are available, even from a single source. Novice courses are generally designed for people who have never used *1-2-3* or even a computer, for that matter. Intermediate-level courses usually assume that you know how to operate a computer and have at least experimented with the *1-2-3* tutorial. Advanced courses require that you be familiar with the basic *1-2-3* operations and be capable of creating worksheets and manipulating data; these courses cover such topics as macros, data functions, and advanced functions.

A new development in the seminar marketplace is the creation of "vertical market" training sessions that focus on a specific population and target all the workshop examples to their needs. This can be a way to get a customized training session without paying for a custom program.

To examine the potential effects of these various factors, I chose four programs: the half-day "Introduction to Lotus *1-2-3*" from Computer Town, a computer store in Salem, New Hampshire; "Advanced Lotus *1-2-3*" at the Productivity Center of the Center for Advanced Data Processing in New York City; the two-day "Lotus *1-2-3* for Sales and Marketing Professionals" taught at Boston University Metropolitan College; and a two-day lecture/demonstration on *1-2-3* and *Symphony* offered by the Software Institute of America in Andover, Massachusetts.

This group includes at least one course from each level of difficulty and from each kind of sponsoring agency (national and regional university/nonprofit, computer store, and private center). The first three offer hands-on instruction, but the fourth does not. The courses cover a wide spectrum of approaches and skill levels. They range from 4 hours to 2 days in length and cost from $195 to $347.50 per day. Some courses give participants a disk filled with valuable templates to take home, while others offer only a collection of handouts as a reference.

Perhaps the most striking difference is in the objectives of these sample courses. The Productivity Center and Computer Town courses teach participants skills that they can put to immediate use. For example, the Productivity Center course description leads off with detailed objectives: "Upon completion of the workshop, participants will be able to design and implement complex financial and operational models using the advanced spreadsheet capabilities of Lotus." Jim Moriarty of Computer Town points out that the Lotus tutorial will not let you make mistakes, but his course lets you experience the consequences of making errors and then he shows you how to correct them.

The Boston University and Software Institute seminars do not aim to provide competency but instead focus on exposing

The Productivity Center and Computer Town Courses teach participants skills that they can put to immediate use. On the other hand, the Boston University Metropolitan College and Software Institute seminars instead focus on exposing participants to the power and potential applications of 1-2-3.

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PRODUCT
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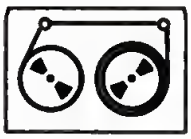
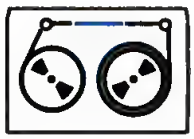
Here's the big news: just like any DOS-controlled hard or floppy disk, PC/T enables you to create directories and files on tape. Then you can call up the exact file you need, and change a portion of the tape without having to erase and overwrite the entire cartridge.



Without PC/T, you have to rewrite the entire 60 MB cartridge each time you make a single change.



With PC/T, you create and directly access files on tape, just like with floppy or hard disk.

PC/T formats each new tape cartridge, just like you format any hard or floppy disk, locking out bad blocks to assure that every bit of data you write to tape is recorded with utter accuracy.

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the participants to the power and potential applications of *1-2-3*. Bill Luther, who conducts the vertical course "Lotus *1-2-3* for Sales and Marketing Professionals" at the Boston University Metropolitan College, actually uses Lotus's *Tutor* in the early part of his session, but he spends most of the time working with a series of complex marketing templates that show how *1-2-3* can be used for market analysis. "The purpose is not to learn *1-2-3*; it is to learn whether or not a computer can help with marketing," he explains.

Edie Harris, an instructor at the Software Institute of America, takes a demonstration approach she designed for efficiency. Harris points out that "the *1-2-3* reference manual is one of the best in the industry, but it's not a user's manual; you can't read it cover to cover." People get overwhelmed by the mass of information, don't have the time to wade through it all, and simply need a setting where they can go to learn about the program. She teaches hands-on sessions for some clients but finds that it takes 3 hours or more to do a hands-on Profit and Loss Statement exercise. Yet, she can demonstrate the same example in less than half an hour and can cover far more material in a single day using this method of instruction.

Many of the participants in these four courses agree with the instructors about the Lotus tutorial: its value is limited because it forces you along a specific path. Some participants, however, believe they would have been lost in the seminar if they had not gone through the tutorial on their own first. The seminars build upon that experience rather than replace it.

> Participants and instructors in these four courses agree that the Lotus tutorial is of limited value because it forces you along a specific path.

Classroom sessions give participants the opportunity to get immediate answers to their questions. They can focus on the program away from the distractions and interruptions of the workplace. Many also mention the value of the take-home materials because they can use them as guides for their own practice and exploration after they return to their offices.

SEMINAR LIMITATIONS

The seminar approach does have some disadvantages, however. Almost all participants agree that classes are best for orientation and exposure to such advanced concepts as macros, but hands-on experience on the job is the best way to actually learn the program. According to one participant, "Seminars don't intend to make you fluent during the class; the instructors show you how to use a program and then you go back and practice."

Most seminars have handouts and/or disks with sample files that the participants use during the sessions, but they may be of uneven quality. One course simply offers a command reference manual, while another only gives essentially the tables of sample data and reports to be used during the hands-on segments. Another hands out reproduced overhead transparencies used in its presentation, along with some exercise worksheets. As standalone products, the

1-2-3 SEMINARS

Expanding Lotus 1-2-3: Macros and Functions
American Institute for Professional Education
100 Kings Rd.
Madison, NJ 07940
(201) 377-7400
Price: $765
Duration: 3 days
CIRCLE 651 ON READER SERVICE CARD

Using Lotus's 1-2-3 in Business Applications
Advanced Lotus 1-2-3
American Management Assoc.
135 W. 50th St.
New York, NY 10020
(518) 891-0065
Price: Applications, $890/$775 (AMA members); Advanced, $610/$550 (AMA members).
Duration: Applications, 3 days; Advanced, 2 days.
CIRCLE 650 ON READER SERVICE CARD

Lotus 1-2-3 for Sales and Marketing Professionals
Boston University Metropolitan College
University Seminar Center
850 Boylston St., #415
Chestnut Hill, MA 02167
(800) 255-1080
(617) 739-6700 (in Mass.)
Price: $695
Duration: 2 days
CIRCLE 649 ON READER SERVICE CARD

A Hands-On Approach to the Capabilities of Lotus 1-2-3
Center for Management Development
Bryant College
Smithfield, RI 02917
(401) 232-6200
Price: $295
Duration: 1 day
CIRCLE 648 ON READER SERVICE CARD

Lotus 1-2-3
CompEd Learning Centers
10 East 21st Street
New York, NY 10010
(800) 223-7822
(212) 505-0080 (in N.Y.)
Price: $450
Duration: 2 days
CIRCLE 647 ON READER SERVICE CARD

Introduction to Lotus 1-2-3
Computer Town
304 S. Broadway
Rte. 28
Salem, NH
(603) 893-8812
Price: $150
Duration: 4 hours
CIRCLE 646 ON READER SERVICE CARD

third type is the most useful. Participants of other seminars say the handout materials can be very uneven; some are poorly produced and riddled with typos and errors, while others are obviously the result of careful and professional effort.

Two of the hands-on courses in the sample group provide sample files on a disk for the participants, yet only one lets them keep the disk to use for practice and review. It is not uncommon for the instructor to keep the sample disks; perhaps they fear that someone will copy their examples and thus steal their course. While this is understandable, it makes it far more difficult for the participant to practice what they have learned after they leave the seminar. The third hands-on course in my sample doesn't have files created on a disk, but participants create files during the course and keep the disk.

Other course handouts include book lists and article reprints on relevant topics. One course even hands out copies of one of the more popular *1-2-3* books as part of the course materials.

Perhaps the biggest problem with training seminars is matching the specific objectives of the course with the expectations of the participant. In many cases, it is extremely difficult to know in advance what the course offers because the only information you are given is the course title and a few lines of description. Even if you have a list of clear objectives, you may still find that the course doesn't meet them. A related problem is that the examples used in these seminars are usually typical financial exercises, such as budget analysis and projection and loan calculations. If your work doesn't involve such applications, you may find it hard to adapt the examples to your own work.

Perhaps the biggest problem with training seminars is matching the specific objectives of the course with the expectations of the participant.

In other cases, participants have ended up in the wrong courses, but they have only themselves to blame—or their managers. Some instructors relate situations where a manager has arranged training for staff without orienting them at all. As a result, the instructor is confronted by a room filled with dazed people. One manager told his staff to take the advanced Lotus course immediately because space was available and that they could take the intermediate course (a prerequisite for the advanced course) at a later time.

LOOK BEFORE YOU LEARN

How can you protect yourself and get the most out of the time and money you spend on program seminars? The first rule is to select the course carefully. You should make certain that you and the course are a good match.

Read the promotional material carefully. If it doesn't clearly list measurable objectives, you should contact the sponsoring agency for pertinent information, such as samples of the handouts and details on what you will take away with you at the end of the session (Note: disks with sample files are a definite advantage). Find out what real-world experience the instructor

Lotus Hands on Workshop
National Institute for Management Research
P.O. Box 3727
Santa Monica, CA 90403
(213) 450-0500
Price: $495 for 3 or more
Duration: 2 days
CIRCLE 645 ON READER SERVICE CARD

Lotus 1-2-3
New Jersey Institute of Technology
Division of Continuing Education
323 King Blvd., Room 612M
Newark, NJ 07102
(201) 596-3060
Price: $180
Duration: 1 day
CIRCLE 644 ON READER SERVICE CARD

Advanced Lotus 1-2-3
Productivity Center of the Center for Advanced Data Processing
450 Seventh Ave., #402
New York, NY 10123
(212) 736-5867
Price: $195
Duration: 1 day
CIRCLE 643 ON READER SERVICE CARD

Introduction to Lotus 1-2-3
Rensselaer Polytechnic Institute
Office of Continuing Studies
Troy, NY 12180-3590
(518) 266-6442
Price: $425
Duration: 2 days
CIRCLE 642 ON READER SERVICE CARD

Symphony, Lotus 1-2-3
Software Institute of America, Inc.
8 Windsor St.
Andover, MA 01810
(617) 470-3880
Price: $275 each
Duration: 1 day each
CIRCLE 641 ON READER SERVICE CARD

Financial Spreadsheet
Using Lotus 1-2-3
Integrated Software
Advanced Lotus 1-2-3
University of Bridgeport
Metropolitan College
271 Park Ave.
Bridgeport, CT 06601
(203) 576-4800
Price: $250 each (a 20% discount for 3 or more)
Duration: 4 evenings (12 hours total) each or 2 full days.
CIRCLE 640 ON READER SERVICE CARD

The Practical Use of Lotus 1-2-3
Advanced Lotus 1-2-3
Worcester Polytechnic Institute
Office of Continuing Education
Higgins House
Worcester, MA 01609
(617) 793-5517
Price: Practical Use, $745; Advanced, $595
Duration: Practical Use, 3 days; Advanced, 2 days.
CIRCLE 639 ON READER SERVICE CARD

1-2-3 TRAINING

has had with the program and what qualifications he or she has to teach the course. Get copies of evaluations or, better yet, the names of past participants, so that you can find out what others think of the seminar.

Here are some additional questions you should get answered before you sign up: Is it a hands-on program? How long does the seminar last and can you expect your attention span to hold up that long? Will the examples used in the session be useful to you in your work? Are there any prerequisites for the course that you have not met?

If you have successfully answered all the above questions and still find yourself in a disaster of a course, you do have some recourse. Only the Boston University Metropolitan College has a money-back guarantee, but you will often find that a polite but firm complaint will earn either a switch to a different (and, it is to be hoped, a more appropriate) course or a full refund. In most cases, your dissatisfaction will result from a misunderstanding, and the sponsor will want to smooth out any problem.

Many instructors invite you to call if you have any questions after the course, but few participants take advantage of the offer. Instructors claim that calls are truly welcome because they offer some direct and personal feedback about the effectiveness of the program and the changing needs of the marketplace.

Classroom training is not for everyone; it is best for those who want to get some exposure to the potential application of a program. If you want to gain specific competencies, you have to make certain that the course not only offers them but backs them up with ample take-home materials.

Don't expect to attend a seminar that lasts a day or two and come out a *1-2-3* expert. Achieving that goal still requires lots of practice, review, and experimentation on your own. If you view the seminar as a springboard from which to launch your learning, you will probably have a successful experience. Be sure to look for the program that will propel you in the right direction and give you plenty of follow-through to help keep you on course.

—Alfred Poor

Alfred Poor is a free-lance writer and consultant for Soft Industries in Southington, Connecticut.

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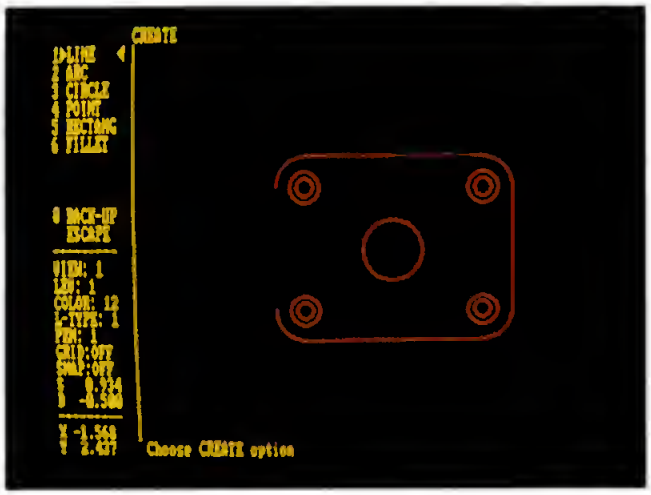
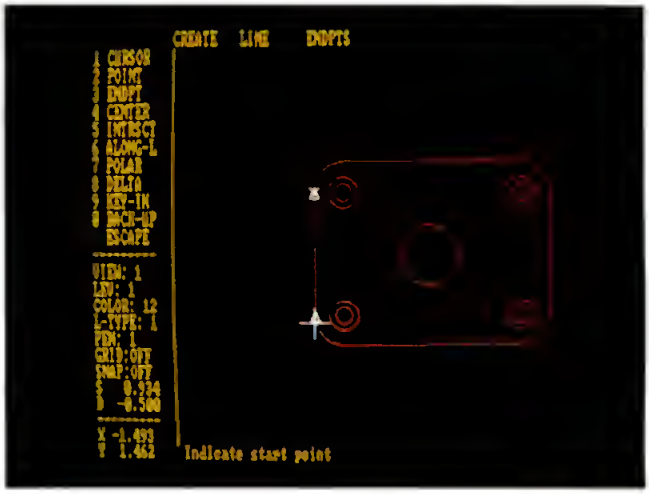
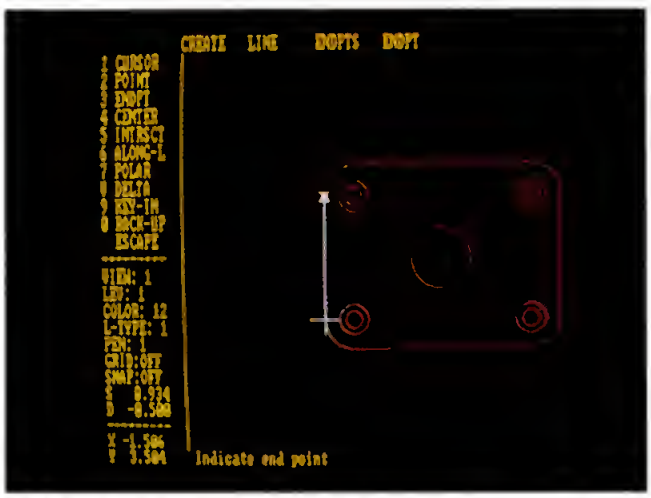
CIRCLE 219 ON READER SERVICE CARD

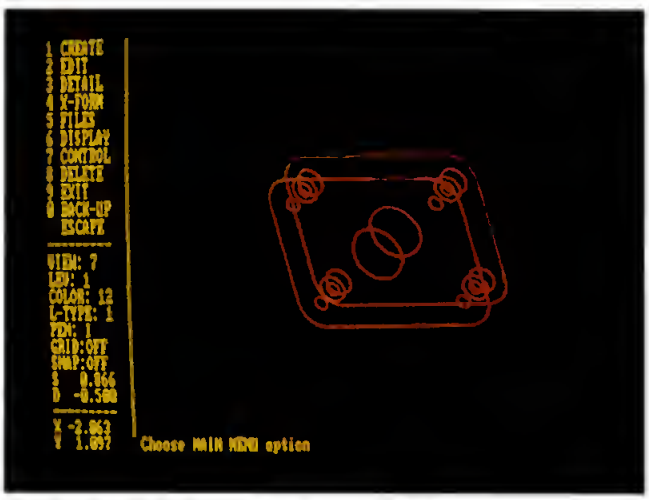
CAD 3-D DESIGN

Rendering a three-dimensional object on a two-dimensional piece of paper usually means a painstaking reconstruction of the way it looks in three dimensions. Often architects, planners, or engineers must redraw objects as they might appear from different angles. By bringing computer-aided design (CAD) features once available only on mainframes to the PC, low-cost CAD programs have aided this process. However, until recently such programs lacked a 3-D capability. Among the first to offer this capability, *CADKEY* from Micro Control Systems, Inc., adds true three-dimensional graphics to its fully integrated two-dimensional CAD system.









Figures 1 to 3: *(top left and right, bottom left) The progression of prompt and history lines during the creation of a line.* **Figure 4:** *(bottom right) An isometric view of the figure.*

A powerful graphics system for the PC, CADKEY creates unlimited 3-D views, makes up to 256 overlays, and introduces many other features that make tedious design chores easier.

FROM ANY ANGLE

Without actually redrawing a three-dimensional image, *CADKEY* allows you to look at it from different angles as though you were holding a model of it in your hands.

CADKEY also automates one of the most tedious and disorderly aspects of drafting—creating overlays. Once you design the basic floor plan of a room or building, for example, you generally make successive overlays on tracing paper to show plumbing, electrical wiring, lighting, and furniture. When all of these are finished, you could wind up with quite a pile of onionskin. With *CADKEY*, you can create the equivalent of 256 layers of tracing paper and use as many as 16 colors. You could also alter a small portion of, say, the electrical plan by calling up the

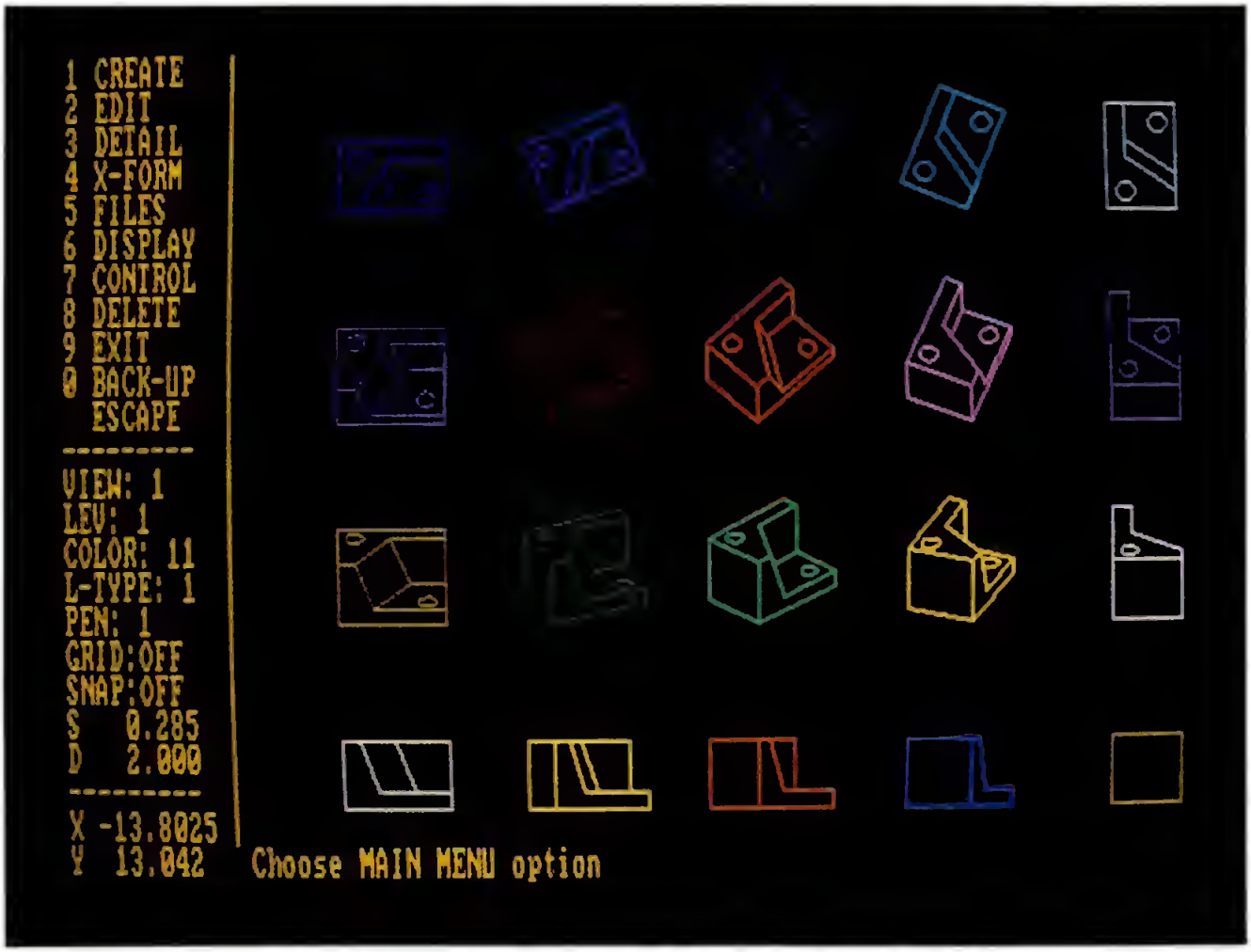


Figure 5: *Once you have specified the depth of a 2-D drawing,* CADKEY *automatically connects the endpoints of the lines. It thus creates a true 3-D image that you can recall in many different orientations on the screen.*

electrical level and making your change, without the problems of messy erasing or torn tracing paper.

Engineers and electrical designers as well as architects and space planners can benefit from the program because it can store and use all types of symbols. Moreover, *CADKEY* is fast, easy to use, and extremely powerful. Although it's completely menu driven, it offers a combination of function-key and Alt-key sequences to bypass or enhance menu choices.

Using Windows

CADKEY's design reflects the way people really work. For example, to avoid a confusing array of commands, *CADKEY* "windows" the screen into several functional areas. These information windows are placed at the left of the screen since, in normal reading, your eyes scan from left to right. At the upper left is the menu options window, which contains the main menu at start-up. As you make selections from this menu, additional menus appear, presenting further choices. You use either function keys or the cursor (controlled by mouse or digitizer tablet) to make your choices. The menus can be modified.

CADKEY lets you look at an image from different angles as though you were holding a model of it in your hands.

Located just beneath the menu options window, the status window contains information about the current display. This window includes the level, color, line type, scale, and view number, which keeps track of the unlimited number of views you can create. Directly below this, the cursor tracking window diplays the *x,y* coordinates of the cursor.

The largest window on the screen is the drawing window. Besides displaying detailed drawing views and the cursor location, this window contains a history line at the top of the screen and a prompt line at the bottom. The history line tracks your actions so that you always know what you've done, and the prompt line asks you for your next choice. This information is quite handy, since it allows you to orient yourself and continue quickly after an interruption. Figures 1 through 3 illustrate the progression of the prompt and history lines

CADKEY's Main Menu Functions

Powerful features at the heart of CADKEY make it easy to draw and organize the varied parts of a complex design project.

CADKEY's effectiveness comes from the simplicity of its command structure. Each main menu function—there are ten—corresponds to a function key and can be invoked by that key. To use the program, you combine these function keys with keystrokes denoting "immediate" mode commands into a sequence that takes you to the program's deeper levels as you make your choices more precise. These sequences are so simple that they quickly become second nature. However, you can also select functions by moving the cursor with a mouse or digitizer tablet. The full list of main menu functions is given here, along with a few examples of submenu choices.

F1

Create displays the six drawing choices: line, arc, circle, point, rectangle, or fillet. Selecting any one displays immediately a third menu that asks how to construct the particular entity. For example, selecting **Circle** displays a menu with five methods of construction: center plus radius, center plus edge, three points, tangent, and two points. Choosing any one of these options displays the appropriate prompt for drawing the shape.

F2

Edit trims or extends existing lines or arcs or recalls deleted entities. Edit's **Trim** function is view dependent. If two lines look as though they intersect, Trim treats them as if they do and locates their intersection. **Recall,** also known as an "oops!" recovery, retrieves the last entity deleted.

F3

Detail allows the application of dimensions, labels, and notes that conform to either ANSI or ISO standards. It makes automatic dimensioning available for linear and angular lines, arcs, and circles, along with arrows and witness lines.

Dimensioning a line is simply a matter of indicating the starting position for the first witness line, the second witness line, and the location of the text. Instantly, two witness lines are drawn, and the distance between them is displayed with arrows. The prompt now asks for the next line to be dimensioned; you can continue dimensioning lines without reselecting from the main menu again.

The Detail function also includes a text mode, which governs the text height, arrow locations, number of decimal places allowed (up to four), font (box or slanted), and number of witness lines. All of these can be preset and will remain until changed.

F4

X-Form (for transformations) changes the size and/or orientation of geometric entities.

You can translate entities from one location to another by selecting the appropriate *x, y, z* coordinates, or by referencing an old and new base position. Alternatively, you can use the Copy command to move or copy objects to a new location, or to draw objects repetitively at various locations on the screen. These objects can be rotated about an axis going into the screen (2-D rotation) and scaled to any size.

during the creation of a line.

Since menu-driven programs are often slow, users tend to accept slowness as the price for ease of use. *CADKEY*'s menu bypass for experienced users greatly enhances its speed. For example, to create a line by defining its endpoints, using the key sequence Esc-F1-F1-F1 will place you at the same point as the Create, Line, and Endpts menu choices. Pressing the escape key always returns you to the main menu, and you can also use it to end a command or back out of an incorrect sequence of commands.

A good test of a program's "friendliness" is to see how much you can accomplish without resorting to a look at the manual. *CADKEY* let me draw a fairly complex, two-dimensional multiview part, dimension it, then save it to disk without having to refer to the manual at all. The prompt lines were sufficient, and I quickly found myself using the function-key shortcuts.

To avoid a confusing array of commands, CADKEY "windows" the screen into several functional areas.

Immediate-Mode Commands

CADKEY's immediate-mode commands are a unique feature. These 24 commands include automatic scaling, color, cursor tracking, English/metric conversion, level, line type, redraw, scale, view, and window. You can call them at any time from anywhere in the program. Suppose, for example, that you want to measure the length of a line. The prompt line displays "select first endpoint," which you can easily indicate by positioning the cursor where you want the line to end. The prompt line next displays "select second endpoint," but suppose the second endpoint is close to a series of lines and cannot be easily distinguished. You could escape to the main menu, redraw the area to a larger scale, and repeat the measurement sequence, but an easier solution would be to select the immediate-mode function Alt-W (alternate window) at the second prompt. Alt-W defines a window around the area in question, and *CADKEY* then redraws the selected area to fill the screen—greatly expanding its scale and spacing the

F5

Files saves or retrieves information files.

CADKEY supports three types of information files: part, pattern, and plot. A part file contains the basic information about a part or drawing and can be stored or retrieved at any time. A pattern file is a part-independent file containing entities that can be inserted into a part file. If you were using *CADKEY* to design logic circuits, oft-used components such as AND gates, OR gates, decoders, resistors, capacitors, and others could be stored as pattern files and quickly recalled to their proper position on the screen. Plot files are files that code a part or pattern for plotting. Once stored, these files cannot be recalled to the screen and can be viewed only by plotting them.

F6

Display lets you manipulate a drawing without permanently affecting its point coordinates. It features a powerful **Zoom** function that enlarges a portion of the displayed drawing so that you can examine it in finer detail. The zoom function can be called repeatedly to add almost infinitely detailed resolution.

Display's other features allow changing the current view or level, redrawing the display, adding a display grid to the screen, and "snapping" between positions a known distance apart. A **Pan** function, which redefines the center of the display, relocates the display window. The **View** function, which deserves special mention, incorporates eight built-in views: top, bottom, front, back, right, left, and two isometric views. Together, these views allow the three-dimensional object to be seen in all the standard positions. However, you can create an unlimited number of views at any angle or rotation. Instead of actually rotating the image itself, *CADKEY* rotates your viewpoint, or position, around the image. Any view can be used for drawing, dimensioning, or measuring, and all views are automatically numbered and updated.

F7

Control functions help you locate and alter a select portion of your drawing. They include **Verify**, which displays the attribute and coordinate data of a selected entity—useful in determining on what level a particular entity resides; **Attribute**, which allows you to view or change features such as color, line type, and width, and controls the pen number for multiple-color plotters; and **Toggles**, which switches between English and metric units and displays the cursor coordinates.

F8

Delete removes unwanted entities from a part of the display by selection or level. Single entities, a window of entities, selected levels, or the entire display screen can be deleted.

F9

Backup lets you back out of the last command you selected.

Escape always returns you to the main menu, regardless of your position in the program. Backup and Escape always remain in the main menu area, even when submenus are displayed.

—Harv Weiner

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lines farther apart. The prompt for the second endpoint now appears again, and the measurement can be completed. At this point, you can use Alt-V (alternate view) to change the angle from which you view the lines or objects, then scale the drawing automatically with the Alt-A (alternate autoscale) sequence.

Other Features

CADKEY includes many powerful features usually found only on mainframes. It automatically uses all available computer memory, and when RAM is full, it dumps the additional file contents to floppy or hard disk. This method allows it to handle file sizes in megabytes. *CADKEY* uses 32-bit floating-point numbers to calculate the distance between points. Unlike integer-based calculations, those with floating-point numbers allow very high image resolution for drawing precision and unlimited scaling capability. All menu, prompt, and status files are stored as text files on the system diskettes and are easily modified with a text editor or word processor. This separate storage means that prompts can be changed for specific applications, or all text can be converted into a foreign language.

In many CAD systems, selecting an entity such as a line, point, arc, and so on is time consuming. Searching through a large file to find these entities reduces the system's overall response time. By scanning only those levels of the drawing that appear on the screen, *CADKEY* can find any entity in a 2,500-entity display within 1.5 seconds.

Plotting has always been a problem on PC-based systems. Many systems inhibit rapid plotting while you are designing on

PC FACT FILE

CADKEY 1.1
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Vernon, CT 06066
(203) 647-0220
List Price: $1,895; program updates for 1 year, $200
Requires: 512K RAM, DOS 2.0 or greater, two floppy disk drives, color/graphics card.

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the same computer. In addition, they require that you reformat a drawing each time you change plotters. *CADKEY* creates device-independent plot files that have a universal output format and can be used only for plotting output. This method allows plotting to be accomplished on another PC, or even a low-cost PC*jr.*, without tying up the workstation. (All drawing files for actually working on-screen are created in ASCII format.)

The utility that creates these plot files is a *CADKEY* plotting program called PLOTFAST. A menu-driven program that

> By scanning only those levels of the drawing that appear on the screen, CADKEY can find any line, point, or arc within a 2,500-entity display within 1.5 seconds.

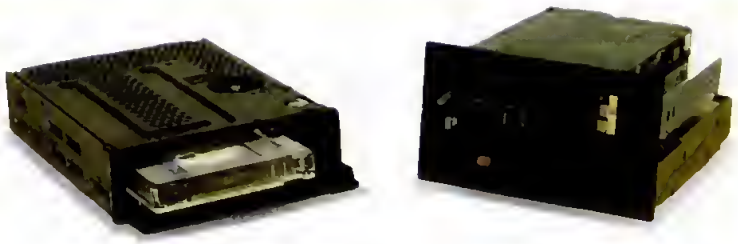
can be configured for a wide variety of plotters, PLOTFAST operates independently of the main program. Screen dumps to a dot matrix printer can be obtained at any time in *CADKEY* itself by using the immediate-mode command Ctrl-Q.

CADKEY conforms to drawing standards established by the American National Standards Institute (ANSI) and the International Standards Organization (ISO). Optional features include 2-D and 3-D IGES (Initial Graphics Exchange Standard) file compatibility, needed to transfer part files from other CAD systems. Meeting these standards enables *CADKEY* to fulfill the requirements for an inexpensive remote CAD workstation.

Copy Protection

CADKEY uses an interesting copy-protection scheme. You must install a Software Interface Module in one of the computer's expansion slots. The software checks to make sure that this hardware security device is in place every time you boot the program. Though it does tie up a slot, this device allows you to use the DISKCOPY command in DOS to make

BT60 Streamer $895
The Stack $999



Don't suffer the loss of losing data. **BT60 Streamer** uses a half-height streaming cartridge tape unit that runs on a 5-1/4 in. controller card. Menu-driven software makes it easy of use. Copies up to 60 Megs on one tape at an amazing 5 Megs per minute! Recommended for systems with at least 130 watt power supplies. **The Stack** includes our **PC20** internal hard disk system and the **BT/SP10** tape backup system. **BT/SP10** plugs into the floppy controller card--no extra slot needed--and is accessed like a floppy. It uses spools of tape ($12.95 each or 5 for $49.95) that hold up to 10 Megs each. Software provided allows you to back up the **PC20**.

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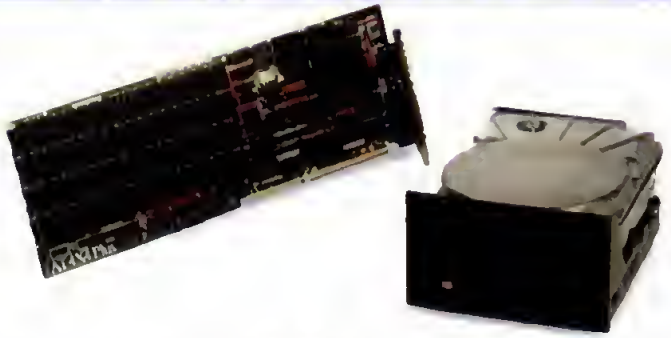

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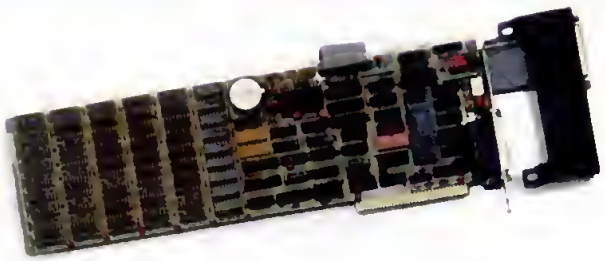

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unlimited backup copies of the software. An optional external security device is also available. When inserted in series with the keyboard connector at the rear of the computer, this external device ensures the same level of security but frees the expansion slot inside the computer.

Installation

Installing *CADKEY* is straightforward but requires hardware setup and software configuration. The hardware portion consists of setting the proper switches on peripherals, then interfacing them to the computer. Since there is no universal configuration for an RS-232 serial port, some difficulty in hardware installation can arise. In my case, the gender of the connector on my mouse was the same as the one on my serial card, requiring me to construct a gender changer (two sockets wired back-to-back) before the mouse could be connected.

To install the *CADKEY* program itself, you use a menu-driven CONFIG program that tells *CADKEY* which display screen, display card, and tablet or mouse you are using. You can also establish the color of the menu text, screen dimensions, tablet resolution, and cursor size. To change the given information, simply rerun CONFIG from the disk directory at any time.

You start your design session by entering the name of a part file. This part file can be a previously drawn shape or a new part to be created. You then make your first selection from the main menu (see sidebar, "*CADKEY*'s Main Menu Functions").

Creating an Image

A simple application best illustrates *CADKEY*'s simplicity and power. Let's assume, for instance, that you want to draw a spacer block 2.25 inches wide, 1.875 inches high, and 0.88 inches thick with several holes. After booting the system, you would enter the part name SPACER at the prompt. You then select Create Rectang Wid/Ht from the main menu (Esc-F1-F5-F2) and enter the width and height dimensions of the rectangle at the prompts. Next you select the position on the screen where you want the image to appear, and *CADKEY* instantly draws a rectangle. To continue, you return to the main menu and

select Create Fillet Trim (Esc-F1-F6-F1); at the prompt, enter the fillet radius of 0.25 inches. You can then select the lines where you want the fillet to be inserted, and, as you designate each corner, *CADKEY* inserts a 0.25-radius fillet.

To position the holes, you return to the main menu and select Create Circle Ctr+Rad (Esc-F1-F3-F1), indicating the radius of the holes to be added. Use the cursor to indicate the position of the centers, and *CADKEY* draws the holes.

Now the advantages of the 3-D feature of the program become apparent. Instead of having to draw lines to indicate the third dimension, you simply return to the main menu and select X-Form Trans-R Join All Dsp (Esc-F4-F1-F3). This sequence tells *CADKEY* that you want the spacer block to be 0.88 inches deep. By automatically connecting the endpoints of the lines, *CADKEY* has created a true 3-D image. If you now want to see different views of the block, you can indicate what angle you wish to see it from by hitting different keys. For example, to see an isometric view, you can invoke the immediate-mode command Alt-V and select view 7. If the view is not centered on the screen, the immediate-mode command Alt-A will rescale the entire part or image and indicate the scale in the status window. The part can now be saved as a "pattern" file and inserted into a blank drawing in the views desired. In this way, a front, top, side, and isometric view can be created on one sheet with a minimum of effort. These views are then saved as a part file and as a plot file for output to a plotter. Figure 4 shows the part in an isometric view, and Figure 5 shows how a pattern can be recalled to the screen in many different orientations.

> Once you have gained some familiarity with CADKEY, you should need the manual only for an occasional reference. Considerable proficiency can be achieved without using the manual at all.

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You can add notes, dimensions, and labels at different levels and in different colors and display these levels individually or in groups. To avoid forgetting where entities are stored when you have many levels, you can use the Verify menu option, but it is good practice to establish groups of levels for various features. For example, actual part construction can occur on levels 1 to 99, dimensions on levels 100 to 150, text on levels 151 to 200, and so on.

Documentation

The manual, divided into tabbed sections so that you can locate information quickly, is very well written. The "Setting Up" section provides complete information for setting up digitizers and plotters and includes specific model numbers, switch settings, connector pinouts, and information on troubleshooting. This section also describes the installation and operation for the copy-protection device of the CONFIG program.

The "Getting Started" section explains the various windows and symbols used and the coordinate systems. Other sections contain detailed information on entity selection and position indication. All major functions are clearly described, and a tutorial introduces the basic building blocks of the *CADKEY* program. An appendix contains hardware requirements, definitions, immediate-mode command listings, and a complete set of flowcharts depicting the various levels of each menu command.

It may sound too good to be true, but CADKEY delivers all that it promises.

Mainframe Capabilities

However, once you have gained some familiarity with the program, you should need the manual only for an occasional reference. Considerable proficiency can be achieved without using the manual at all. The *CADKEY* package also contains two demo disks that demonstrate the program's capabilities and perform all functions except part filing.

It may sound too good to be true, but *CADKEY* delivers all that it promises. With no significant flaws or omissions, it puts a sophisticated 3-D CAD system with mainframe capabilities into your hands at a reasonable price. ■

Harv Weiner is a microcomputer consultant and a contributor to several microcomputer publications.

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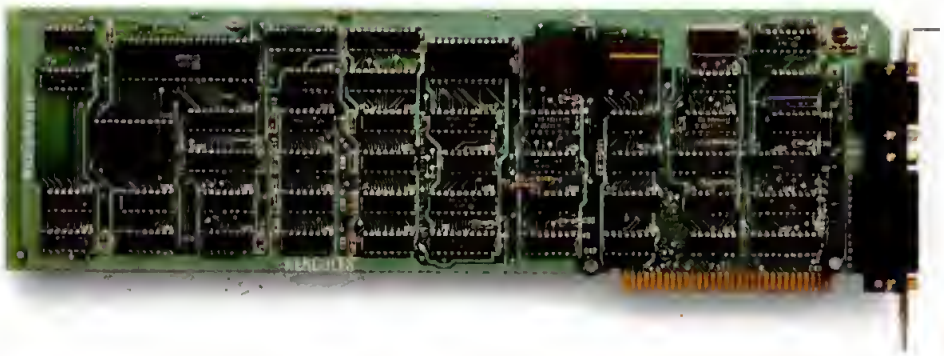

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CIRCLE 145 ON READER SERVICE CARD

Core's Hard Disks: WORKHORSES of Performance Computing

Core International's big, fast, tough add-in mass-storage systems for the AT use proven technology to gain speed, quadruple capacity, and avoid the problems said to plague the AT's factory-issue hard disks.

Running a floppy disk–based AT system makes about as much sense to me as betting on a three-legged horse to come in first in the Preakness. The AT comes into its own only in performance computing—where results are more important than mere dollars—and where a floppy disk would seem to be a hindrance.

It comes as a surprise, then, to find that nearly half of the AT sales so far have been for floppy-only systems. The smart money, according to some experts, was being spent on the cheaper machines for two very good reasons: First, the initial short supply of enhanced ATs created waiting lists that stretched months beyond the horizon. Second, horror stories about hard disk malfunctions—whether true or not—frightened off even the most loyal fans of the boys from Boca Raton.

But even without these reasons, purchasing an AT sans Winchester can be an astute strategy if you buy one of the AT-plus series of add-in hard disk drives from Core International. Core promises a big, fast, tough mass-storage system without the problems often attributed to the AT's factory-issue hard disks. Moreover, these Core drives can also expand an enhanced AT's native hard disk endowment, doubling or nearly quadrupling its straight-from-the-factory storage capacity.

The two Core drives I reviewed represent opposite ends of the ATplus product spectrum. The plus20 is as close to a direct replacement for IBM's own hard disk choice as you can get. The plus72 is Core's flagship unit, stuffing about three and a half times the megabytes of an ordinary AT hard disk into a package of the same physical size.

When tested, the drives matched most of their maker's claims. Both proved easy to install and operated perfectly. In fact, the biggest flaw was the optimism reflected in plus72's name—the number refers to unformatted disk capacity. Formatted, it stores only 66,879,488 bytes (split between two partitions). The plus20 is more appropriately named: it holds a total of 21,309,440 formatted bytes.

Adding a Winchester to an AT is not as simple as doing so for an older PC, into

which you can plug nearly any disk that spins. Getting the high performance that everyone—including IBM—expects from the AT requires a very high-performance hard disk. In fact, one of the principal reasons why IBM chose Computer Memories, Inc. as a supplier for its AT line was that the new design of its drives offered low price combined with high speed, which could help make the AT both a price and performance leader.

CMI's innovative mechanical engineering cut the average access time (how long it takes the read/write heads that fly over the hard disk to move between random tracks, settle down, and start reading) to under 40 milliseconds. Compared to the PC-XT's hard disk, whose average access time is about 110 milliseconds, that's a blazing performance, indeed. Few low-priced hard disks can even sort between tracks within 70 milliseconds (the XT takes over 100); hence the average bargain-basement hard disk impedes the performance the AT is capable of.

Unfortunately, the novel technology of the CMI drives is thought by some to be one of the AT's hard disk weaknesses. The Core drives avoid innovation, using proven technology so as to eliminate every possibility of a problem. That design objective is achieved with some impressive, heavy-duty hardware.

The Core of the Matter

Sturdier hard disk drives than the ATpluses are difficult to imagine. Both Core units tested are massive, full-height drives solidly built by Control Data Corporation. The shells that cover the disk platters themselves are heavy aluminum castings, differing from one another only in that the plus72 forms a solid rectangle, while the plus20 is a half-circle with a few radial heat-sinking fins. Both are finished in natural aluminum.

Unlike the AT's standard CMI drive, most of the electronic circuitry in the ATplus units is physically protected. The primary electronics of the ATplus drives are tucked on the bottom. A heavy stamped and perforated steel cage covers the boards and prevents just about any foreseeable damage to their components. Though the

PC FACT FILE

ATplus Add-In Hard Disks
Core International
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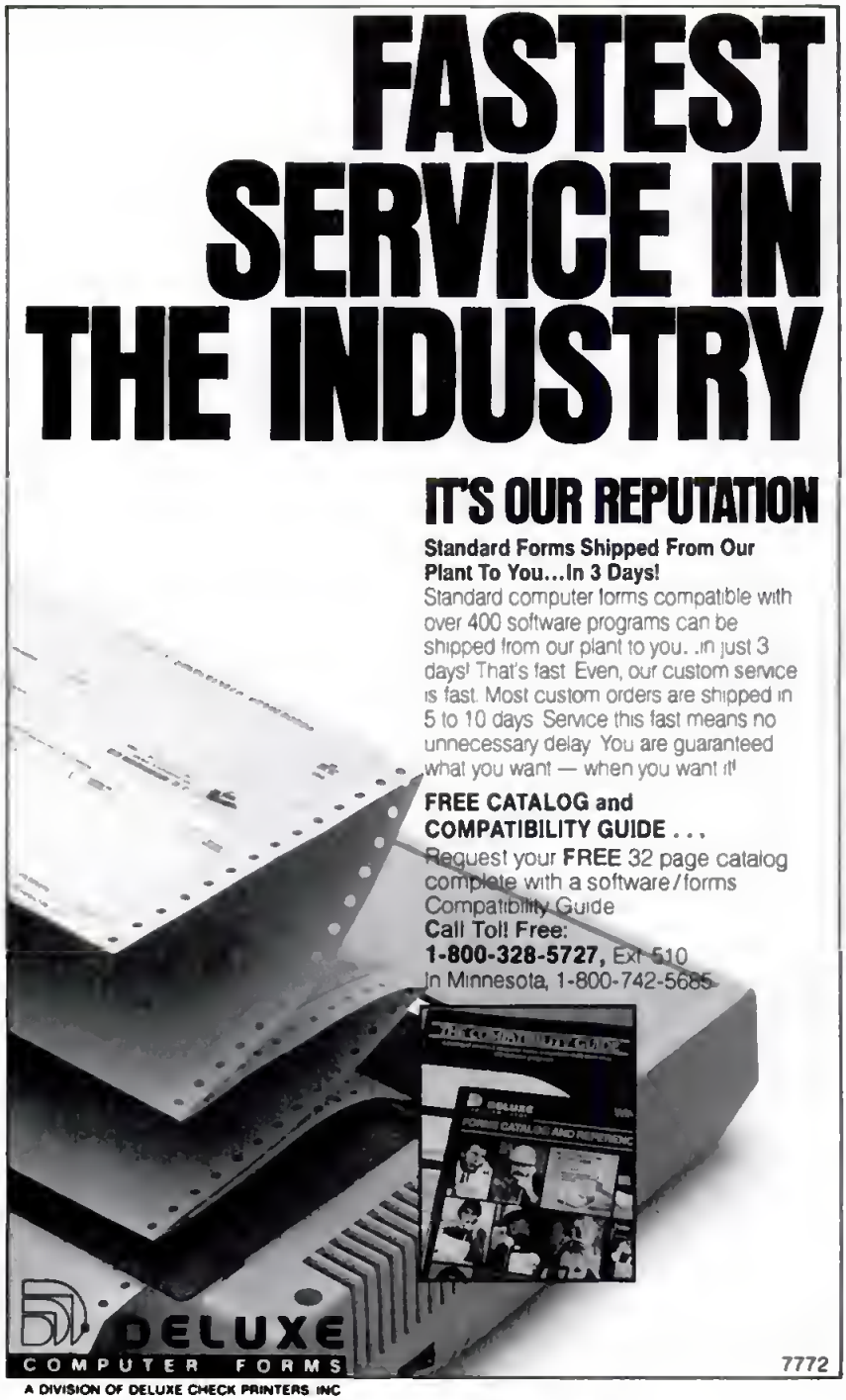
CIRCLE 636 ON READER SERVICE CARD



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CIRCLE 232 ON READER SERVICE CARD

plus20 sports the unprotected bottom of a printed circuit board on its front face (much like the CMI does), no electronics show on the plus72. Not even the drive motors are visible. Manhandle either ATplus drive almost any way you want during installation, and it shouldn't be any worse for the wear.

The disadvantage of this sort of construction is that covering up all the components makes them hard to get at when servicing. On the other hand, covering up the works generally prevents the accumulation of dirt that might make such service necessary. The point is probably moot, because most hard disk servicing consists of directly replacing the whole drive and leaves digging into the actual innards to the factory folk.

The ATplus drives differ from most by using rotary voice-coil head positioning—a proven Winchester mechanism most often found on high-performance 8-inch units. The primary advantage that voice-coil positioners have over the more common band-stepper mechanisms, such as those found in PCs, is speed. Voice-coil positioners are what makes the performance of the ATplus drives so brisk.

Manhandle either of the two ATplus add-in hard disk drives almost any way you want during installation, and it shouldn't be any worse for the wear.

An additional benefit from voice-coil technology is relative freedom from head crashes. While the drive is in operation, the voice coil is constantly kept in an energized state so that it pulls the head into the correct position above the disk, always against the tension of a spring. If perchance the power should fail, the spring automatically and almost instantaneously retracts the head away from the area of the disk used for data storage, so that no harm is done once it touches down. Moreover, the head is locked into its retracted position so that an inadvertent bump when your computer is off won't send it skating across the disk surface, plowing a furrow in your files.

The plus20 sports one additional disk protection feature not present in either the plus72 or the standard AT-issue CMI drive—a manual head lock on its back. Pulling out a small metal arm mechanically locks the read/write heads in place so that absolutely no damage will befall them or the disk surface during shipping.

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CIRCLE 231 ON READER SERVICE CARD

Unfortunately, once the drive is installed, the lever is hidden inside your AT, where it is difficult to reach. Digging into your computer to lock the heads is not worth the effort unless you decide to ship your AT across the country by stagecoach. When the test unit arrived, this slide was not in the locked position. If Core doesn't think much of locking the head, maybe you shouldn't either.

Putting the Core in Its Place

Physically installing the two ATplus hard disks tested entailed essentially the same procedure, made easy by IBM. In designing the AT, IBM evidently recognized the inadequacies of the XT's disk drive mounting scheme (two screws) and developed a system that was sturdier and, in some ways, easier to install.

To install any hard disk drive in an AT, simply pull the top cover off and remove the two small retaining brackets on either side of the drive slot you decide to use. Next, just slide the drive into the open hole in the front of the chassis. A guide rail on both sides aligns the drive in the slot and, because of the tight fit, holds the drive securely in place.

> The AT comes completely equipped with the proper cables and connectors for installing one hard disk drive already stuffed inside.

Before you slide the drive all the way in, however, you must connect the necessary wiring. One wide ribbon cable carries the data from the drive to your computer, a narrower ribbon cable from the computer conveys the instructions that tell the drive what to do, a connector with four wires supplies the drive with its lifeblood electricity, and a single black wire grounds the drive chassis to your computer.

In theory, all these connections should be straightforward. The AT comes completely equipped with the proper cables and connectors for installing one hard disk already stuffed inside. All you need do is match the proper connector to its mate on the drive. The different sizes and styles of connectors ensure that you can't go far wrong.

The drive control and data connectors are keyed with small plastic tabs inside so that they cannot be inadvertently plugged in backwards. Alas, the tiny key can fall out of the connector and ruin IBM's good intentions. In fact, the key was not present in the control cable of my test AT.

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Fortunately, the IBM design follows a simple rule: a slot on the disk drive's edge connector corresponds to the side of the ribbon cable that is edged in color (usually blue). Match the colored edge to the slot, and you'll have it right.

However, what complicates installation is that you have a choice of two data connectors attached to the wide ribbon cable. The one with a section of the ribbon cable twisted near the connector is the proper one to use on the C: drive, which is the first hard disk you install. The other data connector is used for the second hard disk in the system.

Although IBM supplies no control cable for a second drive, Core includes one with every hard disk it sells.

Although IBM supplies no control cable for a second drive, Core includes one with every hard disk it sells. To add a Core as the second hard disk in your AT system, simply plug one end of this extra cable into the hard disk and the other end into the vacant header—a double row of gold-plated pins—on the disk controller card, then plug the remaining connectors that are loose in the computer into the drive.

The Core plus72 drive that I tested matched with all the IBM cabling perfectly. The plus20 missed perfection by just one connection—it had no matching lug for the black IBM grounding wire. Apparently a brass screw post on the back of the plus20 is supposed to serve as a lug. Since Core didn't supply a screw for this post and I didn't want to cut the wire of the test AT to mate with the provided post, I did not connect the ground wire when I installed the plus20. The system seemed to work properly without it.

As delighted as I am with the AT's improved means of mounting the disk drive, I'm disappointed with the delicate manipulations the design requires you to make to connect these cables. Hooking everything up is an experience akin to installing a car radio: Although you know that everything will look and sound right in the end, you've got to squeeze your hand into very

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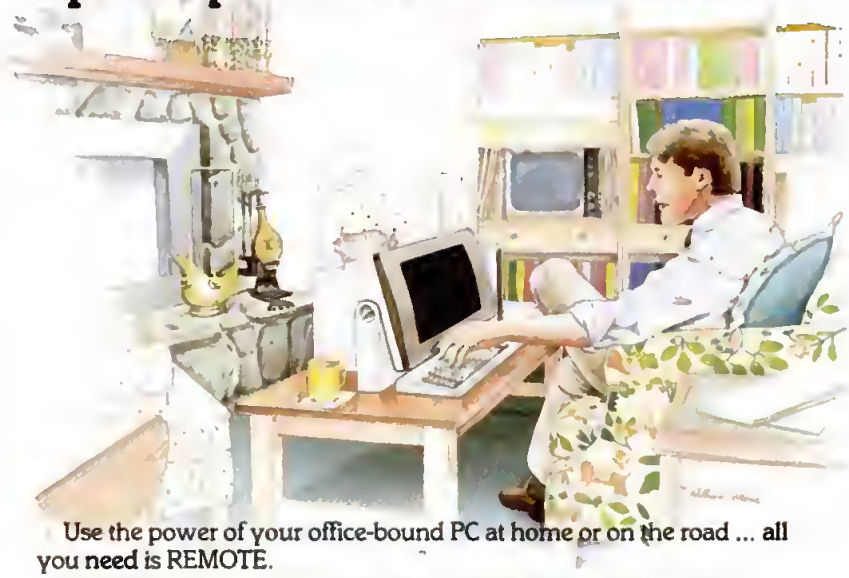

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tight quarters around some sharp sheet metal edges that will almost inevitably bloody your knuckles during the installation.

Once you make all the connections, you need only push the drive all the way back into its slot and reinstall the two small retaining brackets, ensuring that they press firmly against the drive's guide rails. The drive will then be locked tightly in place, perhaps forever. In the case of the plus72, I was afraid for a while that the hard disk might indeed become a permanent addition to the test AT. The fit was so tight that I needed a crowbar to pry it out of the computer: It had stuck about halfway out, requiring abnormal persuasion and two pairs of hands to extract it successfully.

Upping the Chip Ante

Once you're past the hurdle of getting the hardware in place, Core plus20 installation follows the same standard IBM operating procedure as if it had been built into the AT at the factory. First you must configure your system for drive type by selecting the setup procedure from the diagnostics menu. Answer the question about the hard disk drive type by telling your computer that the Core plus20 is a type 2 drive, identical to the factory-issue CMI unit.

As with the official drive, after setup you must partition the hard disk using the DOS FDISK utility, then format it under DOS 3.0 with the FORMAT utility. If you use the /S option to the FORMAT program, your system will be able to boot from the Core hard disk.

Matters are more difficult with the Core

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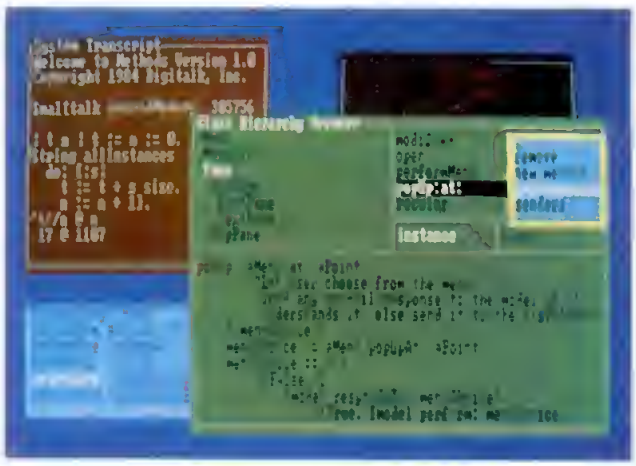

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plus72. After installing the drive hardware, you need to install firmware—ROM chips—so that your system does not reject the transplant. You must remove all the ROMs in your system, which may total two or four, and replace then with Core-supplied chips. The chips you remove contain IBM's cassette BASIC program as well as the BIOS, and this copyrighted code is faithfully duplicated in the Core chips, each of which bears an IBM copyright message in addition to Core's. To my knowledge, IBM has never permitted any other company to duplicate the valuable programming code held inside its ROM chips.

When I called Core and asked about this strange companionship, the technician to whom I spoke would not comment on the relationship between IBM and his company, saying only that IBM was a Core customer and that he therefore could not imagine why the computer giant might be upset about Core's distributing its code.

Unlike IBM, which supplies a special tool with the ROM upgrade kit it sells for the earliest PCs, Core does not supply a chip removal tool with its ROMs. This omission makes removal immensely more difficult. I discovered, however, that a blank slot cover from the back of the AT makes an excellent tool to pry out the chips. Work slowly and gently pry up first one end, then the other, of each chip, lifting it only a fraction of the way at a time.

Installing the chips proved tricker than I had at first anticipated. Being—in theory at least—an old pro at this sort of thing, I knew that ROM chips were delicate creatures that could not tolerate large stabs of static electricity or other mishandling. Consequently I used the utmost care in removing the stock IBM ROMs and replacing them.

My experience in chip matters proved to be my undoing, however. Anyone who has dabbled at integrated circuitry knows that chip sockets are marked to indicate the direction that the chips inserted into them are supposed to face, and I followed these socket markings as I installed the Core chips. When I turned the AT on afterwards, the ROMs acted much like flashbulbs, giving off minute and momentary flashes from the tiny windows underneath their labels. The lack of all other life in the

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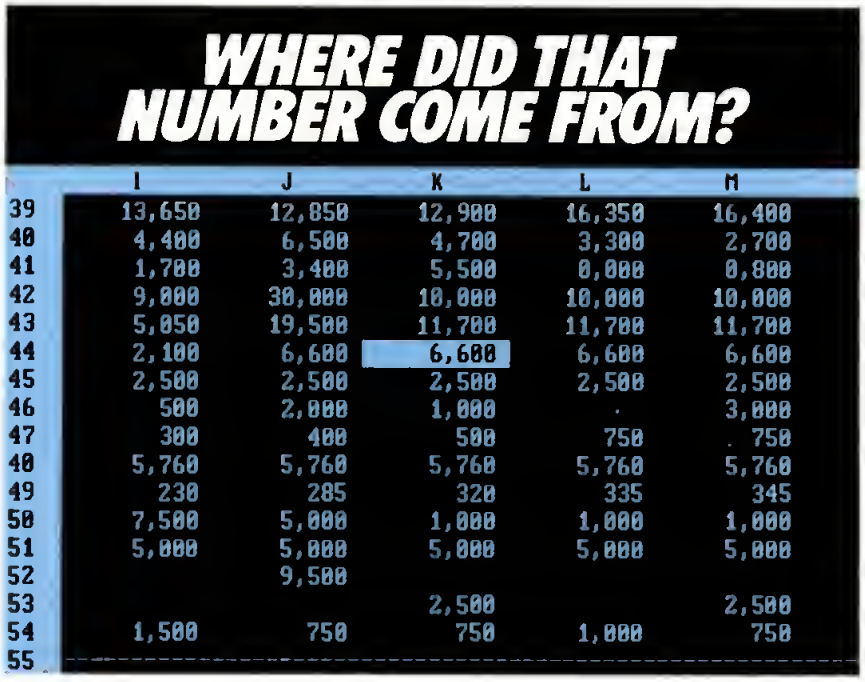

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AT confirmed that I had made a very grievous error.

Reconstructing the crime, I discovered that IBM had installed half the ROM chip sockets in this particular AT backwards. Of course, IBM's assembly machines, unable to read socket markings, installed the chips correctly anyway. When I had properly installed a second chip set, the AT sprang to life. However, because I had already set up the system for a type 2 hard disk and another variety was now resident, the AT was at best lackadaisical about booting. In fact, it took several minutes for it to even admit that it had a disk error. Running the setup utility again and indicating the proper drive type—number 9—made booting up quick and painless. (Those who follow Peter Norton's column should know that a type 9 drive usually runs to 112 megabytes—and the Core totals only 72. Here, apparently, is one of Core's modifications to the IBM BIOS.)

Setup does not end the software installation procedure, however. Next you must run through the standard IBM hard disk installation with the FDISK and FORMAT utilities. Using the /S option with FORMAT allows your AT to boot from the plus72.

Following the Core instructions gives you only one option in partitioning the plus72: to set up the Core disk as a single 32-megabyte DOS partition. Accessing the missing megabytes of the big Core disk requires that you install a device driver in your CONFIG.SYS file to make DOS think that you have added a second disk, drive D:, to your system.

Once DOS realizes that there's more to your Core disk than meets the eye, you must set up its partition structure with a Core-supplied program called ATDISK, then format the partition with another program called ATFORMAT. When that is completed, your Core plus72 operates as if it were two separate 32-megabyte hard disks, drives C: and D:.

Premium Performance

Once you have an ATplus disk up and running, you'll see that the extra dollars you spent will reward you with top performance. Cheap hard disks (20-megabyte add-on hard disk drives can cost as little as $600 or $700) can't make the grade that

IBM has set for the AT: that 40 millisecond average access time. It takes a pretty special drive to scamper through your data at that rate.

Core is so proud of its drives that is has bequeathed to the world a program called *DISKp* for checking out drives (available to readers through *PC Magazine*'s Interactive Reader Service). As you would expect, both Core drives passed the test with flying colors.

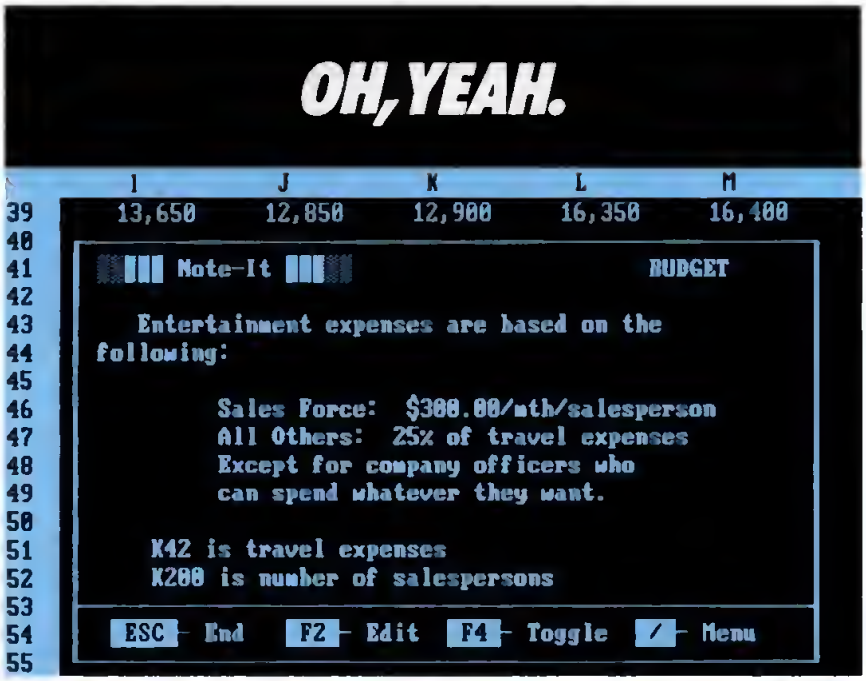
Before I tested the ATplus drives, I first put a normal AT CMI fixed disk through its paces as a control. On the Core random test, it scored an average access time of 37.56 milliseconds, comfortably within IBM's specifications. The Core plus20 virtually duplicated CMI's results, turning in an average access time of 37.89 milliseconds. The Core plus72 was the speed demon of the group, racing through the same test in 25.48 milliseconds, more than 30 percent faster than either its sibling or the CMI.

The *PC Magazine* BASIC read/write tests were startling only because the results showed so little difference. In using records 512 bytes long, the scores for the three drives in the random writing, random reading, and sequential reading tests in seconds were, respectively, CMI: 6.15, 7.09, 4.06; plus20: 6.60, 8.29, 4.17; plus72: 6.48, 6.04, 4.12. Obviously, any of the threesome is so fast that the overhead inherent in compiled BASIC is the ultimate speed-determining factor.

Throughout my testing and trials, both ATplus drives performed smoothly, elegantly, and quietly—without the clangs, rings, burps, and belches I've heard from other voice-coil-based drives. I could hardly hear them purr above the whir of the AT's fan.

Like the standard-issue CMI drive, the ATplus units swing into action instantly and unobtrusively when you call on them. Once you screw the lid back on your AT, they will, in fact, be invisible to you. The sturdiness of their construction means that you can probably put them out of mind as easily as out of sight. You shouldn't have to worry about either one for a long, long time. ■

Winn L. Rosch is a contributing editor for PC Magazine.



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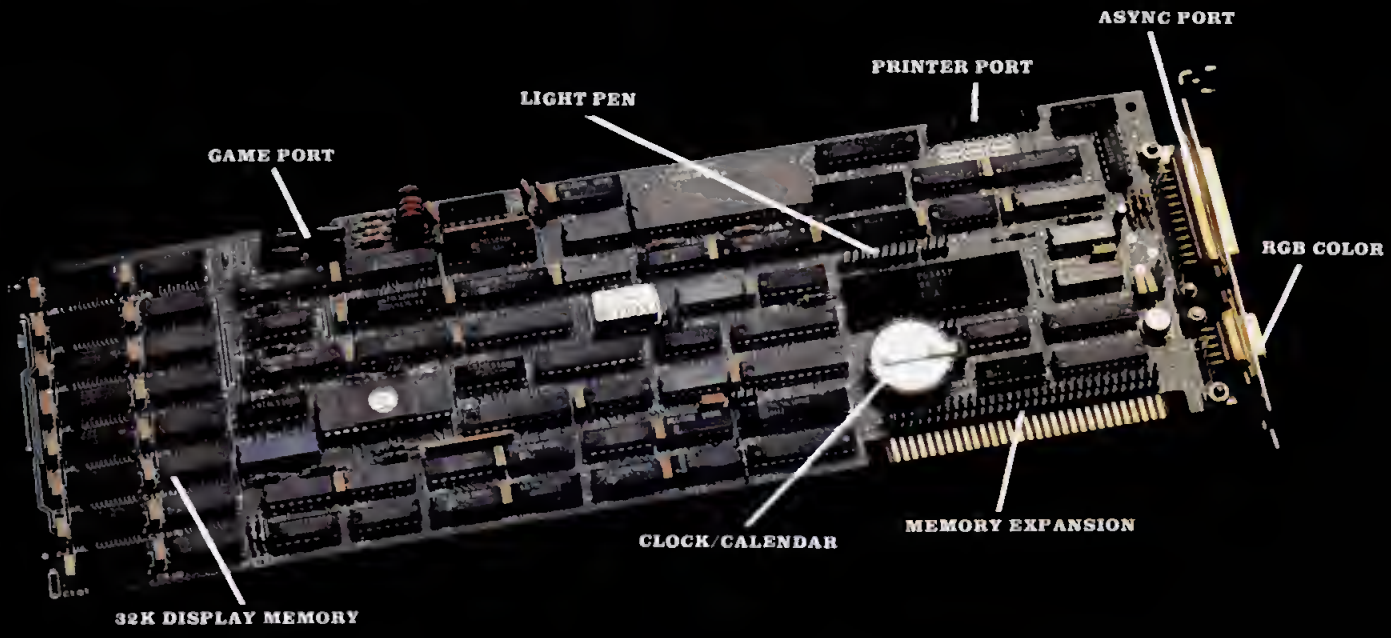

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How to Realize Cache Savings

By putting part of your PC's memory in a disk cache, you'll use a mainframe technique to save time wasted by unnecessary disk accesses.

1985/No. 16

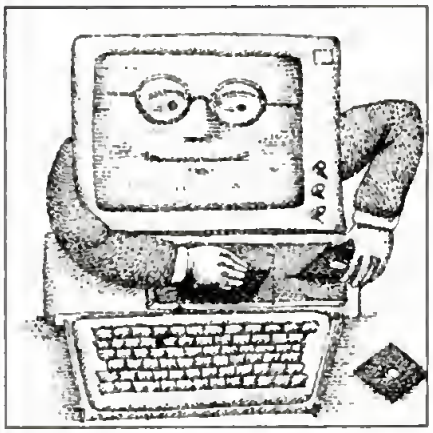


Illustration: Peter Sis

If there is one thing practically every PC owner wants, it's a big, fat RAMdisk. It's only too painfully obvious that mechanical disk drives—particularly floppies—drastically slow you up every time they're accessed. Electronic disks, on the other hand, run at main memory speed, since a RAMdisk is simply a dedicated part of the main memory itself.

Unfortunately, however, many PCs have only 256K (or less) of random access memory. By the time you load DOS, BIOS, COMMAND.COM, and your application program, this may leave only enough room for a small sliver of a RAMdisk. In such cases, the disk cache described in this column represents a better use of your memory resources.

Caching

The concept of disk caching is simple. Every time the PC reads a file, the disk head must move to the appropriate track, engage it, and read off sector after sector from it. Then the head must move to the next requisite track and repeat the process until the entire file has been read. As the data is acquired from the disk, the disk controller uses direct memory access (DMA) to store it directly in memory where the program can use it.

It is at this point that a well-designed disk cache system will step in, read the data that is now in memory, and store it in itself as well. That way, the next time the same data is called for, the disk cache system can step in again, divert control away from the disk controller, and simply transfer the data from its own internal reservoir. Thus, the data can be delivered to the calling program in a fraction of the time it would take the disk controller to get it reread. The cache operates like an on-line RAMdisk that has no drive letter designation.

A proper disk cache must also know when the diskette is changed, so it wouldn't naively step in and supply the data it has stored from sectors of a previously used diskette. Similarly, it must know when the sectors it is storing are written over. And, as data is written out to a diskette, a really good cache system will store it en route, thus saving time if that data is to be called for again. Such a system is called a write-through cache.

Unlike the IBM BUFFERS facility, our disk cache has all these capabilities. (Among other differences, BUFFERS does not create a write-through cache. Also, the buffers are flushed, requiring a fresh disk read, if a program ends but is

then called up again). You can set the size of your cache anywhere from 12K to 62K, and its operation is invisible.

Your Own Copy

The easiest way to acquire a copy of CACHE.COM and its associated .BAS and .ASM files is to use your modem and download directly from *PC*'s Interactive Reader Service at (212) 696-0360. Alternatively, you can type in the BASIC listing shown in Figure 1. When you run this (under DOS 2.0 or 2.10), the program will ask you for a cache size between 12K to 62K. At least 32K is recommended; use 6K per disk drive as a minimum. When the BASIC program finishes and you revert to SYSTEM, you'll find that CACHE.COM has been created for you. Simply typing CACHE will now attach the program to DOS.

Readers who prefer to work in assembly language can get a listing of the commented source code either via the modem number shown above or by sending a self-addressed, stamped envelope to Technical Editor, *PC Magazine*, One Park Ave., New York, NY 10016. In the assembler version you set the size of the cache simply by changing the value of the variable identified as TBL_LEN, originally 64, to the number of sectors you want to cache. (Typical of assembly language variables, TBL_LEN is long enough to be distinct and yet too terse to pronounce.)

Diskettes formatted under DOS 2.0 or 2.10 have two sides and 40 tracks, with 9 sectors in every track. This means you have a total of 720 512-byte sectors, a healthy amount of data. If the Cache program tried to store everything read in from the diskette, it would be quickly overwhelmed under the weight of assemblers, editors, BASICA, and so on. To prevent this, Cache stores sectors only if they are read in singly. Since most application programs, such as BASICA, MASM, Link, or Exe2Bin load as a called *group* of sectors, this strategy maximizes time saved without requiring the creation of a king-sized disk cache.

```
 10  SUM! = 0:PRINT"Checking the Data..."
 20  FOR I = 1 TO 547:READ BYTE.%:SUM! = SUM! + BYTE.%:NEXT I
 30  IF SUM!<>48826! THEN PRINT"Error in the Data Statements":GOTO 180
 40  RESTORE:INPUT"Buffer size; Min=12, Max=62 (in KBytes)";A%
 50  IF A% > 62 OR A% < 12 GOTO 40
 60  A%=A%+A%:OPEN "CACHE.COM" AS #1  LEN=1   'Convert A% to sectors
 70  CLS:PRINT "Creating Cache.Com"
 80  FIELD #1,1 AS BYTE.$                     'Specify what goes into it
 90  FOR N = 1 TO 547                         '547 bytes
100  READ BYTE.%
110  IF BYTE.% <> -1 GOTO 130
120  LSET BYTE.$=CHR$(A%):GOTO 140
130  LSET BYTE.$ = CHR$(BYTE.%)               'Load byte into buffer
140  PUT #1                                   'Write buffer out
150  NEXT N
160  CLOSE #1                                 'Close file
170  PRINT "Cache.Com created."               'And you're done.
180  END
190  DATA  233,  230,    1,   40,   67,   41,   49,   57,   56,   53
200  DATA   32,   83,   46,   72,  111,  108,  122,  110,  101,  114
210  DATA   -1,    0,    0,    0,    0,    0,    0,    0,    0,    0
220  DATA    0,    0,    0,    0,    0,    0,   61,    1,    2,  116
230  DATA   17,  128,  252,    3,  114,    3,  233,  164,    0,  156
240  DATA   46,  255,   30,   28,    1,  233,  135,    0,   83,   81
250  DATA   82,   87,   86,   30,    6,  139,  251,   14,   31,  137
260  DATA   14,   24,    1,  128,  254,    0,  117,   69,  131,  249
270  DATA    6,  116,    5,  131,  249,    2,  117,   59,  232,  207
280  DATA    0,  227,   46,  139,  223,  139,   14,   24,    1,  156
290  DATA  255,   30,   28,    1,  114,   80,  185,    0,    1,  243
300  DATA  167,  227,   69,  141,   54,  227,    2,  139,   14,   20
310  DATA    1,   56,   84,    2,  117,    4,  199,    4,    0,    0
320  DATA  129,  198,    6,    2,  226,  241,  235,   44,  144,  232
330  DATA  190,    0,  114,   42,  235,   36,  144,  232,  148,    0
340  DATA  227,   25,  185,    0,    2,  243,  164,  129,  127,    4
350  DATA  255,  255,  116,   18,  255,    6,   22,    1,  161,   22
360  DATA    1,  137,   71,    4,  235,    6,  144,  232,  152,    0
```

Figure 1: *The BASIC program that will automatically create CACHE.COM.*

By far the slowest way to read data from a disk is to call for it sector by sector. This is because the disk head must be repositioned for each read. Once the head has been positioned, it is almost as quick to scoop up nine sectors from the track as one. Thus, by filling itself with the contents of sectors most frequently read singly, Cache smooths the whole process out.

Even DOS itself uses sector-by-sector reads for the diskette directory and for its own internal disk data, the File Allocation Table (which has the engaging acronym FAT). Since these are continually accessed (if you want to read any file from the disk, you first have to find it in the directory and FAT), Cache keeps them permanently in its memory. For the rest, however, Cache stores only the most recently read sectors and writes over the least recently used sectors first.

This type of caching, Least Recently Used Caching, is the most efficient system and is used for disk caches in practically all mainframe computers. Indeed, in such big machines, memory itself is also cached this way. Most main, bulk mainframe memory is relatively cheap and relatively slow. (To give you an idea of the speeds involved, the PC's own memory was designed to use chips with a 200-nanosecond response.) By keeping sections of the most recently accessed memory in a small, fast (about 50-nanosecond access time) cache, larger computers can increase their working memory access speed, often to 90 percent of the speed of the cache memory alone.

The Particulars

CACHE.COM must intercept the PC's floppy disk controller whenever it is about to read and write to the diskette. Although that may sound esoteric, it isn't actually very difficult, thanks to the PC's interrupt system.

To make a PC out of an Intel 8088 microprocessor, IBM built (or, rather, obtained from MicroSoft) an operating system that "fleshes out" the chip's interrupt provisions with addressable subroutines

```
370  DATA  114,   4,  248,  184,   1,   0,   7,  31,  94,  95
380  DATA   90,  89,   91,  46,  143,   6,  32,   1,  46,  143
390  DATA    6,  34,    1,  46,  143,   6,  24,   1,  46,  255
400  DATA   46,  32,    1,  83,   81,  82,  87,  86,  30,   6
410  DATA   80,  61,    1,   3,  117,  41,  14,  31,  156,  255
420  DATA   30,  28,    1,  115,   7,  46,  143,  6,  24,   1
430  DATA  235,  200,  137,  14,  24,   1,  139,  251,  232,  47
440  DATA    0,  227,   11,  135,  254,  6,  31,  14,  7,  185
450  DATA    0,   2,   243,  164,  88,  235,  171,  14,  31,  180
460  DATA    0,  81,   232,  23,   0,  227,   4,  199,  7,   0
470  DATA    0,  89,   254,  193,  72,  117,  240,  88,  7,  31
480  DATA   94,  95,   90,  89,   91,  233,   7,  255,  80,  141
490  DATA   54,  233,   2,  141,  30,  227,   2,  161,  20,   1
500  DATA  145,  57,    7,  117,   5,  57,   87,   2,  116,  10
510  DATA  129,  195,   6,   2,  129,  198,   6,   2,  226,  237
520  DATA   88,  195,  139,  223,  139,  14,  24,   1,  156,  255
530  DATA   30,  28,    1,  115,   3,  233,  134,   0,  81,  83
540  DATA   82,  141,   62,  233,   2,  141,  30,  227,   2,  139
550  DATA   14,  20,    1,  131,  63,   0,  116,  60,  129,  199
560  DATA    6,   2,   129,  195,   6,   2,  226,  241,  199,   6
570  DATA   26,   1,   254,  255,  141,  62,  233,   2,  141,  54
580  DATA  227,   2,   139,  14,  20,   1,  139,  22,  26,   1
590  DATA   57,  84,    4,  119,  11,  139,  199,  139,  222,  139
600  DATA   84,   4,   137,  22,  26,   1,  129,  199,   6,   2
610  DATA  129,  198,   6,   2,  226,  226,  139,  248,  90,  94
620  DATA   89,  137,   15,  137,  87,   2,  255,   6,  22,   1
630  DATA  161,  22,    1,  128,  254,  0,  117,   8,  131,  249
640  DATA    9,  126,   13,  235,  14,  144,  128,  254,   1,  117
650  DATA    8,  131,  249,   2,  119,   3,  184,  255,  255,  137
660  DATA   71,   4,    6,  31,  14,   7,  185,   0,   2,  243
670  DATA  164,  248,  195,   0,   0,   0,   0,   0,   0,  141
680  DATA   30,  35,    3,  184,  0,   0,  142,  216,  161,  76
690  DATA    0,  46,   163,  28,   1,  161,  78,   0,  46,  163
700  DATA   30,   1,   199,   6,  76,   0,  36,   1,  140,  14
710  DATA   78,   0,   46,  161,  20,   1,  185,   6,   2,  247
720  DATA  225,  139,  200,  46,  198,   7,   0,  67,  226,  249
730  DATA  186,  227,    2,    3,  208,  205,  39
```

(Figure 1 ends)

for communicating with screens, drives, printers, and other external hardware. Whenever an interrupt is executed by the 8088 (by giving it an instruction such as Int 5 (the PrtSc interrupt) in your program), a search is made for an address in a special table in the lowest part of memory. This address contains the location of the subprogram that actually performs the action and communicates with the hardware—in this case, printing the screen. This way, IBM has wrapped pages of specialized code into a single, neat command.

The interrupt used to communicate with the disk drives is Int 19. Depending on how you have set the 8088's internal registers, you can read sectors from the disk, write them from memory, format a track, or perform a variety of other functions. Our nimble Cache program, therefore, slips in and simply replaces the original Int 19 address with its own address. Thus, whenever DOS performs an Int 19, it gets diverted to Cache.

When a program wants to read a specific area on the disk, the Cache program can act like a filter. If that sector has already been stored in memory, all Cache has to do is to transfer it from storage to where it's required. If that sector hasn't yet been stored, Cache can read it and store it by using Int 19.

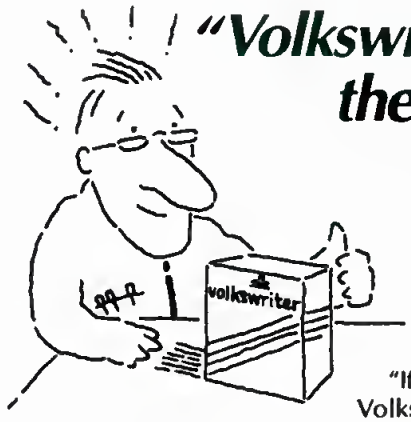
When a program wants to read a specific area on the disk, the Cache program can act like a filter.

Changing Disks

So far I've only discussed what happens when working with a single diskette. In the course of using the PC, however, you often change diskettes, and unless Cache can detect the changes, it might end up supplying old sector data from the first disk to new applications.

To prevent this, Cache uses the same test DOS does. Whenever DOS is asked to read a file from disk, its first operation is to read in Track 0, sector 2 (the first sector of the File Allocation Table) or Track 0, sector 6 (the beginning of the directory). Sector 2 is commonly read in first, since it contains the disk identification byte, telling DOS what format to expect. The directory is then read in to tell DOS where to find the file it wants.

Since they must be consulted so frequently, Cache always keeps the File Allocation Table and the directory in the memory. Whenever sector 2 or 6 is read, Cache compares all 512 bytes to what it already



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has. If they don't match, Cache resets ("flushes") all the sectors it has previously stored from that drive.

This means that even after whatever you're doing is securely in Cache, there must still be a short disk read at the beginning of an operation. It's intriguing, though, to see the drive turn off in the middle of a long directory listing, for example. (DOS also checks the FAT at the end to tell you how many bytes are free on the disk, so the drive will still turn on again briefly.)

Even after whatever you're doing is securely in Cache, there must still be a short disk read at the beginning of an operation.

How Fast Is It?

The speed you will gain, inevitably, depends on what you're doing. As far as straight reading from the disk alone is concerned, I've tested Cache with a program that first reads a sector on one track, then reads a sector from a different track and repeats the whole process 50 times. Before caching, the program took a full 25 seconds to run; after caching, it took about 1.

On the other hand, even though programs usually will read in data sector by sector, they are also usually engaged in some processing. Thus, even though the data comes in faster, the overall time isn't overpoweringly improved. For example, as BASIC reads in a program it tokenizes it, converting it into the tokens it can recognize, and this process takes some time. Still, even loading longer BASIC programs will be sped up by about 20 percent.

The process of assembling and linking also depends on the size of the program. For large programs, assembling, not disk reading, takes the most time so the overall process may again be shortened only by about 20 percent. For small programs, however, the process is limited by disk speeds, and so Cache can increase the speed by 45 percent (not much more than that, however, because the disk must be written to and not just read).

At any rate, however, you'll find Cache is a neat little package that will soon save far more than the time it takes to get it up and going and will additionally reward you with the satisfaction of knowing that you're using your PC's memory as efficiently as possible. ■

Steven Holzner is a contributing editor to PC Magazine.

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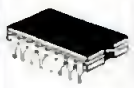

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CIRCLE 165 ON READER SERVICE CARD

EDITED BY JARED TAYLOR

Spreadsheet Clinic

This forum offers our readers an opportunity to exchange the quick fixes, simple solutions, and fancy footwork they've developed to make their spreadsheets work better.

Shrinking a Spreadsheet for Maximum Memory

If you use large *1-2-3* models, your computer may run out of memory. An obvious way to get memory back is to get rid of unnecessary cells. If you decide you don't need cells beyond a certain point in the worksheet, go to the cell just below the last useful cell and hit /Range Erase (End) (Home) Enter. This will erase everything between the last useful cell and the last cell in the worksheet.

However, you won't get all your memory back just because you erased the cells. If you hit (End) (Home) again, you will find that the cursor ends up at the cell that was last in the spreadsheet *before* you used /Range Erase. In other words, *1-2-3* thinks the spreadsheet is still the same size as before, even though the cells are blank. It will release the memory it was using to store the cell contents but will still require some memory just to keep track of the blank cells it thinks are still part of the worksheet.

To get all your memory back, do a /File Save and then a /File Retrieve. By reading the worksheet back into memory, *1-2-3* figures out that the blank cells really *oren't* part of the spreadsheet and thus releases the memory it was using to keep track of them.

There are times, though, when even this technique won't work. Even after the /File Save—/File Retrieve sequence, the (End) (Home) command still may take you to a blank cell (the last one before your /Range Erase) at the bottom of the worksheet. The reason is that some of the now-blank cells were either unprotected or formatted with the /Range Format command. In either case, *1-2-3* treats them as if they held data, refusing to give them up, and so wastes memory on them.

You can solve this problem by using /Range Protect (End) (Home) and /Range Format Reset (End) (Home). These operations disable the special status of these cells and allow *1-2-3* to ignore them. Now, after you have saved and retrieved the worksheet, you will find that you have gotten all your memory back.

Tom Spross
Cedar Crest, New Mexico

1-2-3 is notoriously poor ot monoging memory, so it's a good thing RAM chips have become so cheop. Releose 2.0, which is due this foll, will use memory more efficiently. In the meontime, tips like this one are o big help.

Printer Setup Files

We have a smorgasbord of different printers connected to our PCs and have had trouble keeping track of the different printer setup codes needed to control each one. I got tired of drawing up code sheets, and so I worked out a system of printer setup worksheets instead. These files contain no data—only a printer setup string. I merge a worksheet into a file when I am ready to print.

For example, the control code to make the DEC LA100 printer run at 12 pitch is Esc[2w. To set up a *1-2-3* printer setup file, you clear the worksheet, give the /Print Printer Options Setup command, and enter the string 027/091/050/119. Then save the spreadsheet using as descriptive a name as possible, say, LA10012P.WKS.

Now, whenever I have a spreadsheet to print on the LA100 in 12 pitch, I first do a /File Retrieve of LA10012P. Then I do a /File Combine Copy Entire of the spreadsheet I want to print. This puts the right setup string in my spreadsheet without my having to fumble with the printer codes.

Jeffrey Katz
New Bedford, Massachusetts

This procedure works fine. Another woy to do the some thing would be to build o worksheet that contoined only the mocros necessory to display ond execute o menu of different printer setup options. You might, for example, have o file with o menu for the vorious setup options for the DEC LA100. You could then retrieve that file, choose the right option, ond let the macro write the setup string. Then, since the next operotion will be o /File Combine, the mocro would erose oll the cells in the setup worksheet. You could then combine the file you want to print ond get the some result os described obove.

This method hos the advontoge of requiring only one printer setup file per printer. Mr. Kotz's method requires o file for every single printer option, though it's foolproof ond much simpler to implement.

Making a Table of 1-2-3 Range Addresses

Symphony has a Range Name Table command that lists the cells represented by range names. *1-2-3* does not have this feature, but a short macro I have written (Figure 1) will produce the same table that

```
   E              F                                  G
-------------------------------------------------------------------------------
\T      /c~{right}~                      'Copy this label name to right
        /rncCC~{bs}.{right}~             'Name these 2 cells as Current Cells (CC)
        /xi@count(cc)=0~/xgSORT~         'If blank, go to SORT step
        {right}{edit}                    'Edit duplicate label name
        {home}{del}@sum({end})~          'Convert to @sum(x) formula
        {edit}{bs}{home}                 'Edit again
        {del}{del}{del}{del}{del}'~      'Convert formula back to label
        {left}{down}                     'Go to next label name in list
        /xg\T~                           'Loop back to process next address label
SORT:   {up}{end}{up}                    'Position cursor for sort
        /dsr                             'Reset sort parameters
        d{bs}.{end}{down}{right}~        'Define data range
        p~a~g                            'Define sort key . . . go
```

Figure 1: *A macro that will create a table of range names—and sort them.*

Symphony does and will sort the list of range names alphabetically.

To use the macro, first make a list of range names in a column in your worksheet, as in the "before" part of Figure 2. Make sure that there is an empty cell above and below the list and that there are no empty cells within the list. When you are writing the macro, remember to give the range name SORT to the cell where the sort routine begins. To fill in the table with the cells in each range, put the cursor on the first range name of the list and run the macro. (I call the macro \T for table.)

This macro is a big help in keeping track of ranges in complex worksheets. Whenever I create a new range, I add it to the list of names and rerun the macro. This keeps the documentation current and accurate.

Michael Krietemeyer
Akron, Ohio

This is a very clever macro, especially the procedure in lines 4 through 7 that produces the coordinates of the beginning and ending cells of each range. Nice tip.

Hiding Notes Within a Worksheet

When I build *1-2-3* or *Symphony* models to be used by other people, I make a point of annotating them. I describe all assumptions and, when appropriate, the rationale behind an assumption. However, if the annotations are in the worksheet itself, the result can be visually confusing, and if they are on paper, it may be awkward for the user to refer to them while he is running the model.

Lately, I've discovered a way to "hide" annotations within a worksheet. The trick is to create a new column, only one character wide, to the left of the values you want to annotate. If, when you type notes into that column, you begin with a space or two, the column will normally appear to be empty. When the user needs to read your notes, however, he can move the cursor to that column, and a line of text will appear in the control panel. If he wants to read all the text at once, he can temporarily widen the notes column.

John Schlosser
Seattle, Washington

This is the best way I know to annotate a spreadsheet, though you may need to watch out for a few things. For example, when you're typing in a notation on the second line of the control panel, you can use up to 80 characters. But once that note is entered, and a user wants to read the contents by putting the cursor on that cell, the note will appear in the top line of the control panel, which displays only 67 characters. Hitting the F2 key will bring back all 80 characters, but not all spreadsheet users will think of that.

Another point to remember is that a long annotation will show up in any blank cells to the right, even if the adjacent cell to the right has something in it. Let's say column A contains your notes, columns B and C contain values, and column D is blank for aesthetic reasons. Your note text won't appear in B or C but, if it's long enough, it will peep through in D, which is blank.

A New Set of Keys

In your column you have outlined several shortcuts for entering numeric data into a

```
===== BEFORE =====          ===== AFTER =====

RANGE        CELLS          RANGE        CELLS
NAME                        NAME
LIST                        LIST
=====        =====          =====        =====

SUM                         A            A2..A16
A                           B            C2..G2
C                           C            D5..F13
B                           SUM          C16
```

Figure 2: *A printout of a list of range names in a spreadsheet before running the macro in Figure 1 and after, including a display of the cell locations.*

Lotus spreadsheet (see *PC*, Volume 4 Number 7). I have found that the best way to use the numeric keypad for entering a column of numbers is to use a program like *ProKey* or *Smartkey* to redefine the Enter key as the down-arrow key. That way, you hit NumLock to activate the numeric keypad, and then hit Enter after every number. You won't need to hold down the shift key to move the cursor or fool with macros. And if you need to put numeric data in rows, you can always redefine Enter as the right-arrow key.

Benny Mah
New York, New York

That works just fine. However, I would be leery of deactivating the Enter key, even if only temporarily. Why not redefine the PrtSc key as the down-arrow key instead? PrtSc doesn't do much for you in 1-2-3, *anyway, and this alternative would preserve a key I'd like to keep.*

The Last Word on NumLock

In your column you have already written about shifting back and forth between numeric entry and cursor movement by holding down the shift key (*PC*, Volume 4 Number 7). For those of us who can't walk and chew gum at the same time, I have written a macro that allows single-handed data entry using the numeric keypad:

```
\A  {?}{down}/xg\A~
```

To use it, hit NumLock and then run the macro with Alt-A. You can now use the numeric keypad to enter numbers. Every time you hit the Enter key, the number will appear in the cell, and the cursor will move to the cell below.

If you make a mistake or want to move to a different part of the spreadsheet, hit NumLock and use the cursor control keys to move into position. The macro will still be waiting for your number and will move to the next cell as soon as you hit Enter.

If you work with rows of numbers, you can set up another macro just as easily that moves you to the right every time you hit the Enter key.

Bill Taylor
Lakewood, Colorado

This endless-loop macro is about the slickest solution to the problem I think we are going to see. I'll be happy to be proven wrong, but I think we can now lay this issue to rest.

Contribute to the Clinic

Share your latest spreadsheet discovery through *PC*'s Spreadsheet Clinic. We'll pay you $50 for anything we print, *plus an extra $25 if you submit it on a disk.* If you send a disk, please include a printout of your submission.

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Power User

This column is where readers share their hardware and applications software discoveries. This installment focuses on Turbo Pascal.

In every issue of PC Magazine, *Power User presents a variety of tips for software and hardware applications, concentrating on those products that help businesspeople increase their productivity. This installment focuses on a very special product: Turbo Pascal, Borland's revolutionary implementation of Niklaus Wirth's structured programming language. Everyone from the dedicated hacker to serious managers and professionals is using Turbo Pascal to create utilities, file handlers, sort procedures, and the like to make their jobs easier and their time more productive.*

While many businesspeople may think of Turbo solely as a tool for programmers, those who give it a chance are finding the clear logic and simple structure of this compiler to be a source of new power for their PCs. The following tips should add to that arsenal.

Quick Turbo Entry

I've been using Turbo Pascal recently and decided to make a modification to the compiler so I wouldn't have to answer the opening message that asks "Include error messages (Y/N)?" Answering No to the prompt only saves about 1.5K of memory. It's just not worth the trouble, especially when I take advantage of the type-ahead buffer and find that all of what I typed is lost. The modification will cause the error messages to be included every time Turbo is used.

Tracy Brewer
Charleston, South Carolina

You're right—that opening message in Turbo Pascal is a true annoyance. Answering No may save memory, but it also means you have to look up error messages in the manual. We've changed your patch somewhat so it won't interfere with other Y/N questions the compiler asks. Figure 1 shows the patch for both Turbo Pascal Versions 2.0 and 3.0. You'll need the PC-DOS 2.0 or higher version of DEBUG to make the change. As usual, work with a copy of TURBO.COM when patching with DEBUG.

Changing Editor Colors

If you use Turbo Pascal with a color monitor, you might like to change the default colors that the editor uses. I find the bright yellow characters on a black background to be very harsh. Turbo Pascal Version 2.0 keeps video colors in offset addresses 016Eh through 0170h of the TURBO .COM file.

The low-order nibbles (low four bits) in addresses 016Eh and 016Fh are the foreground text colors for the NORMVIDEO and LOWVIDEO modes, respectively. The high-order nibble is always F. The background color is stored in the high-order nibble of address 0170h, with the low-order nibble always F. These 3 bytes are normally FEh, F7h, and 0Fh. The color codes in these nibbles can be found listed on page 18 of the Addendum of the Turbo Pascal Version 2.0 manual, except that high-intensity background colors are not available and, if used, will cause blinking instead.

LOWVIDEO to brown, use DEBUG to make the following patch in Turbo Pascal Version 2.0:

```
A>DEBUG TURBO.COM
-e 16E  F2  F6  ØF
-w
-q
```

In addition to changing the colors used by Turbo Pascal in interactive mode, this patch will also change the colors in programs compiled under your new version of Turbo. To change to something different within a program, the TEXTCOLOR and TEXTBACKGROUND procedures still work as usual.

William E. Allen
Redford, Michigan

Many people seem to like a blue background with bright yellow characters for normal text and low intensity white for highlighting. In Turbo Pascal Version 2.0, this can be accomplished by patching FEh, F7h and 1Fh in the three locations starting at 016Eh.

Turbo Pascal Version 3.0 handles color a little differently. The real BIOS attributes (background in high nibble, foreground in low) are kept in addresses 0177h and 0178h. The DEBUG patch is

```
-e Ø177 1E 17
```

for yellow and low-intensity white on a blue background.

Disabling the Clear Screen

The review of Turbo Pascal in the November 13, 1984 issue of *PC Magazine* (Volume 3 Number 22) complained about the screen clear that Turbo Pascal always calls at the beginning of program execution. I've found a way to disable it. After this patch has been made, if you want the screen to be cleared in a program, you must use the procedure CLRSCR.

David Issel
Sacramento, California

Borland International apparently listens to complaints. Version 3.0 of Turbo Pascal does not clear the screen when a program begins. Those of you who still have Version 2.0 can use the procedure shown in Figure 2 to disable this initial clear screen.

Changing the Cursor

I developed a method of changing the cursor size within Turbo Pascal that I'd like to share with your readers. This procedure uses the powerful facility of Turbo to call system interrupts without resorting to assembly language.

```
Turbo Pascal Version 2.0                Turbo Pascal Version 3.0
------------------------                ------------------------

A>DEBUG TURBO.COM                       A>DEBUG TURBO.COM
-A 29ED                                 -A 2EB7
XXXX:29ED MOV BYTE PTR [023D],0B        XXXX:2EB7 MOV BYTE PTR [0348],0B
XXXX:29F2 NOP                           XXXX:2EBC NOP
XXXX:29F3 NOP                           XXXX:2EBD NOP
XXXX:29F4 NOP                           XXXX:2EBE NOP
XXXX:29F5 <ENTER>                       XXXX:2EBF <ENTER>
-W                                      -W
-Q                                      -Q
```

Figure 1. *Patches to Turbo Pascal Versions 2.0 and 3.0 to skip past the opening prompt and always include error messages for Pascal compilations.*

```
A>DEBUG TURBO.COM
-e 02FC 90 90
-w
-q
```

Figure 2. *A patch to disable the Turbo Pascal Version 2.0 screen clearing at the beginning of program execution. The 2 bytes found at the address 02FCh are normally CDh 16h—a BIOS video call. Users of Turbo Pascal Version 3.0 don't have this problem.*

```
program Demo;

var  highbar,lowbar : byte;  (* used to test procedure call. *)

procedure setcursor(TopLine,BotLine : byte);

  type
    BioeParamType = record
                      ax,bx,cx,dx,bp,si,di,de,es,flegs : intsgsr;
                    end;
  var
    BioeParam  : BioeParamType;
  begin
    with BiosParam do begin
      ax :=  1 shl 8 + 0;     (* load AH with request to set cursor linee *)
      cx :=  TopLine shl 0 + BotLine;     (* CX with top end bottom linee *)
    end;
    intr($10,BiosPerem);     (* call BIOS Video Service to set cursor linee *)
  end;

begin      (* m a i n    p r o g r a m *)
  write ('Enter highbar of cursor box: ');
  readln (highbar);
  writs ('Enter lowbar of cursor box : ');
  readln (lowber);
  writeln;
  setcursor (highbar,lowbar);
end.
```

Figure 3. *A program demonstrating the SETCURSOR procedure to change the size of the cursor. A normal cursor on a color/graphics display has a "highbar" of 6 and a "lowbar" of 7.*

The cursor is a series of horizontal lines numbered from top (line 0) to bottom (line 7 on color displays; line 13 on monochrome). By calling this procedure with various values of TopLine and BotLine, the cursor can be set to a line, a box, or something in between. Invalid values may cause the cursor to disappear.

The procedure is shown in a program that illustrates the effect it has on the cursor size.

Steve Hall
Beaverton, Oregon

A Turbo Pascal programmer equipped with the PC Technical Reference and the DOS Technical Reference manuals can do most anything an assembly language programmer can. Figure 3 demonstrates the SETCURSOR procedure in action. This is a good example of getting the interrupts to go beyond the already extensive facilities included in Turbo Pascal.

WordStar-to-ASCII-via-Turbo

I've recently had to convert *WordStar* files

```
{$G16384,P16384,D-}                    {Compiler directives for redirection}

program WS2ASCII ;

var
  Ch    : Char ;                       {Character to be read and written}

begin
  While Not Eof Do Begin
    Read(Ch) ;                                  {Get the character}
    Ch := Char(Ord(Ch) And 127) ;               {Strip out the high bit}
    If Ch = ^_ Then Ch := '-' ;                 {Convert soft hyphens to hard}
    If (Ch >= ' ') Or (Ch = ^I) Or (Ch = ^J) or (Ch = ^M) Then Write(Ch) ;
  End ;                                         {Write characters, tabs, CR, LFs}
  Write (^Z) ;                                  {Finally, a final End-of-File}
end.
```

Figure 4. *A simple and elegant* WordStar*-to-ASCII canversian pragram in Turbo Pascal. Since the pragram uses redirectian af standard input and output, it requires Turbo Pascal Versian 3.0 and PC-DOS Versian 2.0 ar above.*

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to pure ASCII files. Since *WordStar* sets the high bit of some characters for internal formatting, this bit must be stripped out. I also wanted to convert "soft hyphens" (stored as 1Fh) to hard hyphens, and also remove all print-formatting codes. The enclosed Turbo Pascal program does this.

Floyd Elliot
Chicago, Illinois

There are plenty of WordStar*-to-ASCII unformatters around, but it's always a good exercise to roll your own. The type of program shown in Figure 4 practically cries out for a PC-DOS 2.0 and above "pipe" or "filter" approach. A piping program reads in one input file, does something with it, and then puts the results in a file. Such programs are simplified greatly by using DOS's redirection of standard input and output. We can write the program as if we are reading from the keyboard and writing to the display and let DOS take care of all the messy disk-file stuff.*

While Turbo Pascal Version 2.0 did not support redirection of standard input and output, Version 3.0 does. That's reason enough to upgrade. Figure 4 shows how to use redirection for a WordStar*-to-ASCII conversion program. I'm sure you won't mind that we've reduced your two-page program to just 13 lines and made it four times as fast.*

Note, however, that all "soft hyphens" will be converted to hard hyphens, so you might want to remove soft hyphens that occur in the middle of lines before running the conversion.

To run the program, type the command line

```
WS2ASCII<inputfile>outputfile
```

where "inputfile" is from WordStar *and "outputfile" will be in ASCII. Don't use the same file name for both. If you leave off the ">outputfile" from the command line, the resultant ASCII file will be displayed on-screen, a quick way to read* WordStar *files from DOS. If you forget the < character before the input file name, the program will just sit there, waiting for keyboard input. Just type a Ctrl-Z and Enter and try again.*

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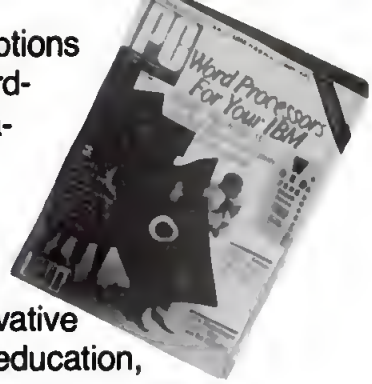

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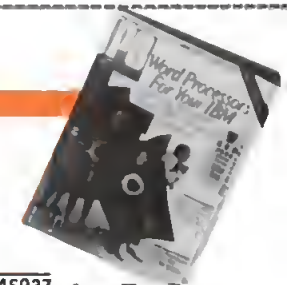

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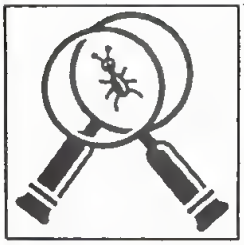

User-to-User

PC readers use this forum to help one another by passing along their solutions, comments, and complaints.

Easy Subdirectory Switcher

Okay, this sounds simple, but sometimes the simplest tricks are the best. My AT hard disk is snarled by such an intricately nested tree structure that switching back and forth between two deeply buried subdirectories used to be a real exercise in patience. Now I can do it instantly, without having to remember each complex PATH prefix with all of its easily mistyped backslashes and inscrutable abbreviations.

The trick is to put a whole slate of one-line batch files in one of the subdirectories you PATH to most often. (Incidentally, the program that performs this trick assumes you're not using subdirectory names with periods and extensions; we've found most users don't.) The name of each batch file is the name of the subdirectory itself (with a .BAT extension) without the long, convoluted PATH-and-backslash prefix. Each batch file contains simply the "CD" command with the long, convoluted PATH-and-backslash prefix.

The BATMAKER.BAS program in Figure 1 creates all the necessary batch files

```
100 'BATMAKER.BAS -- by PC Magazine --
110 'This creates easy subdirectory switcher files.
120 'Before you use this, get into DOS and type:
130 '
140 '    chkdsk / v | find "Dir" > tempfile
150 '
160 'Be sure to (1) run this in a subdirectory you
170 '    PATH to often, (2) check to make sure each
180 '    subdirectory has its own unique name, and
190 '    (3) DON'T CHANGE the program's line numbers!
200 'To switch between subdirectories in DOS, type
210 '    in the name of the subdirectory WITHOUT
220 '    the "CD\" prefix, and WITHOUT the long
230 '    PATHname that usually precedes it.
240 ON ERROR GOTO 370
250 OPEN "tempfile" FOR INPUT AS #1
260 IF EOF(1) THEN 360 ELSE LINE INPUT #1,A$
270 A$=RIGHT$(A$,LEN(A$)-12):IF A$="\" THEN 260
280 FOR A=LEN(A$) TO 1 STEP -1
290 IF MID$(A$,A,1)<>"\" THEN 310
300 NM$=RIGHT$(A$,LEN(A$)-A)+".BAT":GOTO 320
310 NEXT
320 PRINT "Creating ";NM$;" batch file..."
330 OPEN NM$ FOR OUTPUT AS #2
340 PRINT #2,"CD"+A$;:CLOSE #2
350 GOTO 260
360 CLOSE:KILL "tempfile.":PRINT:LIST 200-230:END
370 IF ERR=53 THEN LIST 120-140 ELSE ON ERROR GOTO 0
380 CLOSE:END
```

Figure 1: *BATMAKER.BAS program that creates individual batch files used for switching easily between subdirectories. Be sure to get into DOS before running this and execute the command in line 140 beginning with chkdsk /v. And be sure to run this in a subdirectory you PATH to often.*

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USER-TO-USER

for you automatically. Before you run it, get into DOS and type:

```
chkdsk /v | find "Dir" > tempfile
```

If you try this, be careful that you don't have two subdirectories like \TAX\1984 \JAN and \TAX\1985\JAN, since BATMAKER ignores everything before the final backslash and would try to create two files called JAN.BAT. Also, be careful with subdirectories that have the same name as an executable (.COM or .EXE) file, since DOS gives .BAT files a lower priority and may run a program when all you want to do is change directories. If this happens, rename the batch file—from WS.BAT to W.BAT for instance.

Again, make sure you put all these newly minted .BAT files in a subdirectory you PATH to. When you're all done, to switch back and forth between \NOTES\ROUGH\CHAP1\FIGS and \DOS\BASIC\COMPILER\UTILS\WRK, all you have to do is type in FIGS or WRK. Finally, if you do use subdirectories, be sure to include a line in your main AUTOEXEC batch file that changes the PROMPT to reflect the logged subdirectory. Users who discover this for the first time invariably end up throwing in the date, the time, funny messages, and odd spacings instead of the garden variety A>, but I much prefer the more efficient PROMPT $p: or PROMPT pg instead.

```
100 ' PRNTSCRN.BAS screen dump -- by Jim Anes
110 DEF SEG=&H40
120 HIGHMEM=(((256*PEEK(20)+PEEK(19))/64)-1)*4096+3988
130 DEF SEG=HIGHMEM
140 SBRPTSC=0
150 POKE 0,205:POKE 1,5:POKE 2,203
160 DEF SEG=HIGHMEM:CALL SBRPTSC
```

Figure 2: *PRNTSCRN.BAS routine that when called will dump the contents of a screen from inside a BASIC program.*

```
100 ' RENDIR.BAS -- creates RENDIR.COM -- by Michael F. Roberts
110 OPEN "RENDIR.COM" AS #2 LEN=1:FIELD #2, 1 AS C$
120 READ CHKSUM:IF CHKSUM =-1 GOTO 270
130 READ F$:SUM=0:DS=220
140 IF F$="-1" GOTO 270
150 REPEAT=LEN(F$)\2
160 FOR I=1 TO REPEAT
170 SPOT=(I-1)*2+1
180 BYTE$=MID$(F$,SPOT,2):SUM=SUM+VAL("&H"+BYTE$)*I
190 LSET C$=CHR$(VAL("&H"+BYTE$))
200 STORE.AT=STORE.AT+1
210 PUT #2,STORE.AT
220 NEXT
230 IF CHKSUM =SUM THEN 250
240 PRINT "ERROR IN DATA STATEMENT";DS:NUM.ERR=NUM.ERR+1
250 DS=DS+10
260 GOTO 120
270 PRINT "RENDIR.COM CREATED":END
280 DATA 5531, BF6701BE5C00B90C00FC
290 DATA 5440, F3A483C705BE6D00803C
300 DATA 4773, 20750AB409BA3B01CD21
310 DATA 8556, EB1990B90B00FCF3A4BA
320 DATA 3487, 6001B417CD213C007407
330 DATA 5258, B409BA4D01CD21CD2050
340 DATA 5170, 6172616D65746572065
350 DATA 4095, 72726F720D0A244E616D
360 DATA 5209, 65206E6F74206368616E
370 DATA 2708, 6765640D0A24FF000000
380 DATA   48, 000010
390 DATA -1
```

Figure 3: *RENDIR.BAS program that creates RENDIR.COM file to rename subdirectories automatically.*

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BASIC Screen Dumper

The PRNTSCRN.BAS program in Figure 2 contains a subroutine you can use when you want to print out the contents of the screen from within a BASIC program. To print characters, simply CALL the subroutine; to print graphics, however, you have to run the DOS GRAPHICS.COM utility first. Make sure your printer is on line before you execute this.

Jim Anes
Ontario, Canada

This routine can come in handy, but if you do use it, include traps for errors 24, 25, 27, etc.

Subdirectory RENamer

The DOS 2.0 RENAME command cannot change the name of a subdirectory. To do it manually, you have to create a new subdirectory, copy your files to this new subdirectory from your old subdirectory, delete the files in the old subdirectory, and then delete the old subdirectory name from your disk.

The RENDIR.BAS BASIC program in Figure 3 creates RENDIR.COM, which can rename a subdirectory automatically. To use it, enter the command:

```
RENDIR [drive:]OLDSUB NEWSUB
```

where OLDSUB is the name of the old subdirectory and NEWSUB is the name of the new subdirectory. The drive name is optional and can be used to rename a subdirectory on a disk drive other than the default one. The old subdirectory name must exist in the current directory of the drive you specify. You can also use ? or * in the command but note that using these might cause a regular file to be renamed. For example, if you had a file named GFILE and a subdirectory named GSUB and entered the command:

```
RENDIR G* H*
```

the two filenames would become HFILE and HSUB.

Starting with DOS Version 2.0, the DOS interrupt 33 (21 hexadecimal) gives programmers two sets of routines to manipulate files. The first set is the routines that existed in DOS Versions 1.*x* and were kept for compatibility purposes. The second, newer set of DOS 2.*x* routines can handle path names. While a subdirectory cannot be manipulated with the new routines, the old ones can access it through the use of an extended file-control block.

Two error messages might be returned by RENDIR: "Parameter error" (which means an old and new directory name were not provided) and "Name not changed" (which tells you that either the old subdirectory name was not found or the new subdirectory name already exists).

Michael F. Roberts
Snohomish, Washington

This short and sweet program does the job. Another trick for renaming subdirectories is to go into BASIC and use the NAME filespec AS filespec *command.*

Foolproof BASIC Delayer

A letter in *PC Magazine*, Volume 4 Number 12, suggested a way to create a time-delay loop. The BASIC manual mentions a trick using the SOUND statement that solves this problem for all PCs, XTs, ATs, and compatibles in both interpretive and compiled versions. Figure 4 contains a small demo program that illustrates how this works. Using the TIMER function would also do the job, except that this can't be handled by the BASIC 1.1 compiler, which is long, long overdue for some updates.

```
100 ' DELAYER.BAS -- by John P. Tabakelis
110 INPUT "Enter the number of seconds to delay: ",N
120 TIME$="00"
130 SOUND 32767,(N*18.2):SOUND 32767,1
140 PRINT "The delay lasted exactly ";TIME$
```

Figure 4: *DELAYER.BAS program to demonstrate precise control of timing delays in both interpretive and compiled BASIC.*

The BASIC manual mentions a trick using the SOUND statement that solves the problem of creating a time-delay loop for PCS, XTs, and ATs in both interpretive and compiled versions.

John P. Tabakelis
Malvern, Pennsylvania

The only drawback to this is that it produces a small speaker click. However, it does work on every PC configuration we tried. And we agree it's a real scandal that IBM hasn't released an updated BASIC compiler.

```
A>DEBUG COMP.COM
-e 39a nn
-e 809 "xx"
-w
Writing 09E6 bytes
-q
```

Figure 5: *Instructions for patching DOS* 2.x *COMP.COM to change the number of mismatches it will find before stopping. As an example, to change the number to 14, replace the* nn *with* 0E *(the hexadecimal notation for 14) and the* "xx" *to* "14". *Note: For DOS 3.*x *substitute 879 for 39a and b51 for 809.*

Beyond DOS COMPare

The DOS compare files command (COMP) compares two files until it finds 10 differences, then stops. However, you may occasionally want to continue comparing two files even though the number of differences exceeds this limit.

You can use DEBUG to change the limit from 10 to any number of comparisons you'd like, by following the instructions in Figure 5. Type in everything underlined, replacing *nn* with the hexadecimal equivalent of *n*, (*n* being the new limit) and "*xx*" with the actual characters for *n* (in quotes). A similar patch (see Figure 6)

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```
A>DEBUG COMP.COM
-e 39b 90 90
-w
Writing 09E6 bytes
-q
```

Figure 6: *Instructions for patching DOS 2.x COMP.COM so that it will continue searching regardless of the number of mismatches it finds. Note: For DOS 3.x substitute 87a for 39b.*

will let you change COMP to continue file comparisons without any limit on the number of byte-by-byte differences COMP finds.

Raymond P. Young
Eagan, Minnesota

While this 2.x trick lets you get around the limit of 10 mismatches, it doesn't handle the annoying problem that COMP.COM should be much better at locating similarities than it is at present. If there is just one extra byte at the beginning of one file being compared, COMP gets confused and the whole process becomes meaningless. Note: For DOS 3.x, substitute 879 for 39a, b51 for 809, and 87a for 39b.

If there is just one extra byte at the beginning of one file being compared, COMP gets confused and the whole process becomes meaningless.

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MARK ZACHMANN

PC Tutor

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Finding BASIC's Data Segment

Q: I wrote a BASIC program that uses about 8K of file space when saved. The program contains a 27-byte machine language program and is poked into supposedly reserved space just below the 64K upper boundary of the BASIC workspace. Additionally, a 16K screen display is BLOADed adjacent to the machine language, also below the 64K boundary. I've used a CLEAR statement to reserve 17K of high memory for this purpose.

However, when the display data is loaded, starting at absolute 48128 (segment &HBC0), everything dies.

I tried changing the program to put the machine language program and display data just above the 64K boundary, starting at 65536 (&H1000). The program then works fine for about 50 minutes, after which the data and machine language programs get written over by new data.

I'm using DOS 2.0 on a new PC. Why can't I put my machine language routines just above 64K? And why, for an 8K program with DOS and BASICA loaded, can't I put the routines just below the 64K boundary?

Roy D. Welch
Manchester, Missouri

A: *I think you are confusing the space requirements of BASICA with the absolute addresses in your PC. Don't forget, for example, that there are always other programs in your PC, such as the operating system, that also take up address space.*

Let's suppose (very conservatively) that the operating system takes up 45K in your computer. The BASIC interpreter (another program in memory) takes up another 27K. In such a case, your 64K BASIC program area would actually begin at address 72K (45 + 27) and would continue on through 136K (72 + 64).

What you really need to know, then, is the actual starting address of the BASICA data segment that corresponds to the interpreted program and its storage. The simplest way to find this is with a PEEK instruction, as follows:

```
10 DEF SEG = 0 ' Look at low memory
20 SEGMENT = PEEK(&h510) + 256*PEEK(&h511)
30 ' now SEGMENT is the segment address
40 ' of BASIC's data area (the program+data)
```

Using Line 25

Q: Using BASIC, how can one place a PRINT statement on line 25, in reverse color (for instance), without having the lines scroll up? I don't find any reference in the BASIC (3.0) manual, but many application programs use this location as a handy place to display status information.

Curtis Rambauer
Don Mills, Ontario

A: *You primarily need to ensure:*

1. That the PRINT statement for the text on line 25 ends with a semicolon (;) so that the PRINT statement does not scroll; and

2. That following the PRINT statement, you put a LOCATE line, so the next printout will go to another line.

The following short program gives you a reasonable example:

```
10 KEY OFF ' clear bottom line
20 ' move to alert line, invert video
30 LOCATE 25,1 : COLOR 0,15
40 ' make sure print line ends with ;
50 PRINT "Status Line Message";
60 ' go home for later print statements
70 LOCATE 1,1
```

Old Wine in New Bottles?

Q: IBM has announced that its Enhanced Graphics Adapter (EGA) board is compatible with its older color graphics adapter (CGA) *except* if the software being used makes sub-BIOS calls to the CGA. I just put an EGA in my AT and have found that many programs do make these calls.

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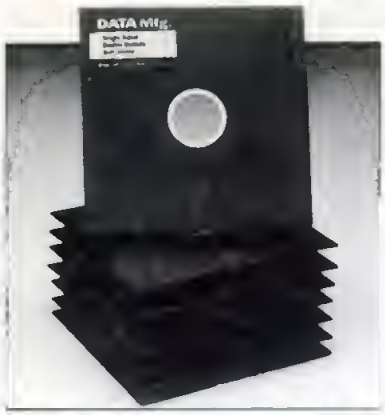

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Could you help me write a program to redirect the calls now being made to the CGA's memory location over to the memory location of the EGA? It would be very helpful if you could also explain how to make it a core-resident program. That way it can survive a warm boot, so self-booting, copy-protected programs can also take advantage of it.

Finally, is it possible to install memory from 512K to 640K in an AT that has an EGA with 256K of graphics memory? Although IBM has not commented on this in its literature, I have heard that the EGA's memory location is below 640K.

Greg Bitterman
Westbury, New York

A: *As a starting point, the EGA's memory begins at 640K, which is easier to understand and visualize as A000 hex. However, like the PCjr, the EGA maps its memory to two different locations. One is A000, and the other is the CGA standard address of B800 (which, if my math is right, is 736K).*

Your problem, however, lies not in memory addressing but in port addressing. On the CGA board a Motorola 6845 chip handles the video. Many programs (such as Lotus's 1-2-3*) manipulate the 6845 registers directly. The EGA has no such chip. Instead, it uses some VLSI (very large-scale integration) chips that are designed both to emulate a 6845 and to handle the advanced features of the EGA. Unfortunately, however, the 6845 emulation is only partial: programs that expect to work into a 6845 will be sorely disappointed. (Why is it that only IBM can get away with ignoring IBM compatibility?)*

As for fixing the problem with a sub-BIOS program, I'm afraid there is no real fix. The only approach is to convince the program writers to use the BIOS initialization calls rather than 6845 register manipulation. The reason many programs bypass the BIOS is that the video calls inside the IBM BIOS are remarkably primitive and rarely do everything one wants done. In desperation, therefore, program writers were forced to bypass the BIOS entirely and work directly with a chip that is now not fully supported. While it is true that the EGA includes newer, updated BIOS video routines of its own, these are still not as complete as they should be. For example, there is still no easy way to use two monitors simultaneously.

The long and the short of it seems to be, use old programs with the old CGA and hope that sometime someone will get around to writing software for the EGA.

Up a Tree

Q: Since purchasing a hard disk, I am facing some organization problems, and with the introduction of TopView things are getting worse.

My problem is that if I am in one subdirectory and want to call a program in another part of the tree, the PATH option of DOS will allow me to call a .EXE or .BAT program file, but not any associated data or .OVL files needed by the program. For example, my PE.EXE program needs PE .PRO. Both are in the EDIT subdirectory, but PATH will only call the former. Is there an answer?

Philippe Flichy
Boston, Massachusetts

A: *I can suggest at least three possible approaches to this vexing problem, which has plagued subdirectory users ever since DOS 2.0 was introduced.*

First, there are a number of public-domain software programs that extend the PATH command capability to include all file searches. Thus, as the program searches for overlay files, it will go to the correct subdirectory. I'm not overjoyed about this approach generally, since at least some of these programs (which are available on any number of bulletin boards) may do strange things when you try to create a file.

Second, however, there are more-sophisticated commercial programs available (such as EasyPath *by Polygon Software Corp) that let you specify certain files that are to be found in specific subdirectories. This tends to make your environment list pretty long, but it does work. (IBM's* File Facility, *a $19.95 utility in its Productivity Series, simply and safely extends the scope of PATH searches without requiring you to list the specific files sought. So also does* FilePath, *produced by SDA Associates—Ed.)*

The third approach is to update your DOS. Version 3.1 contains a program

called SUBST that lets you section off a piece of your subdirectory tree as a drive. For example, if you entered

```
SUBST A: C: \EDIT
```

this would make the EDIT subdirectory accessible as drive A:, and most programs search at least drive A: for required overlays. If your program can handle it, I would suggest using a different drive designator (say E:), since otherwise drive A: will become temporarily inaccessible for other use. In this case, you would just type

```
SUBST E: C: \EDIT.
```

Ctrl-PrtSc Toggle

Q: I often write batch files to execute timing programs that do speed tests on various programs. I usually do a Ctrl-PrtSc first so that all of my results are sent to the printer. Can you show me a way to toggle Ctrl-PrtSc, by using BASIC PEEKs and POKEs or a machine language program that can be entered with DEBUG?

Michael Biance
New York, New York

A: *My preference in a case like this is to use a small assembly language routine, since it is much easier to call and takes up so little room—in this case a mere 48 bytes (30 in hex).*

You can enter the necessary program by typing in the underlined portions of Figure 1. The figure itself combines the parts to type with a hex dump made after the assembly, so you can compare hex codes if necessary for debugging. The xxxx at the beginning of each line is a function of the memory in your computer and so would probably have been different from mine.

One final but important note. This program will only work on IBM PCs and very close compatibles. It assumes IBM's specific placement of the keyboard buffer, and it also assumes the PrtSc flag is located 7200 hex (which may differ on other machines).

The PC Tutor solves practical problems and explains points of general interest. To see your questions answered here, drop a line to PC Tutor, *PC Magazine*, One Park Avenue, New York, NY 10016. ■

```
A>DEBUG PRINTTOG.COM
File not found
-A100
xxxx:0100 B84000      MOV AX,0040  ;set data segment
xxxx:0103 8EC0        MOV ES,AX    ;to BIOS area
xxxx:0105 BB1A00      MOV BX,001A  ;set buffer head to
xxxx:0108 B81E00      MOV AX,001E  ;first pos (flush)
xxxx:010B 26          ES:
xxxx:010C 8907        MOV [BX],AX  ;
xxxx:010E 40          INC AX       ;set to next pos...
xxxx:010F 40          INC AX
xxxx:0110 26          ES:
xxxx:0111 894702      MOV [BX+02],AX ;the buffer tail
xxxx:0114 B80072      MOV AX,7200    ;put PrtSc flag
xxxx:0117 26          ES:
xxxx:0118 894704      MOV [BX+04],AX ;into buffer
xxxx:011B B8000B      MOV AX,0B00    ;read bfr status
                                      ;(set ctlpt)
xxxx:011E CD21        INT 21
xxxx:0120 B8004C      MOV AX,4C00  ;exit gracefully
xxxx:0123 CD21        INT 21
-RCX
CX 0000
: 30
-W
Writing 0030 bytes
-Q
```

Figure 1: *A program you can enter with DEBUG to create a command to toggle the PC's Ctrl-PrtSc function.*

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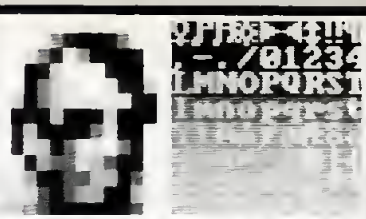

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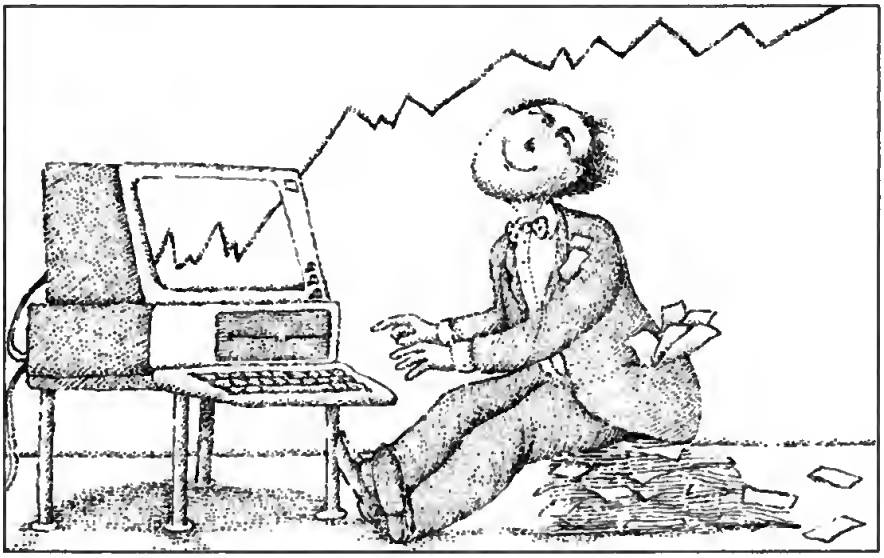

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Stock Graphs

With the Stock Graphs option, you are asked to select a stock. You can enter either the stock's ticker symbol or the partial or full name of the stock you want to view. The screen will then clear, and in less than 30 seconds a graph of the stock you selected and the main menu for the

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stock will appear together on-screen.

The graph consists of bars, each measuring the high, low, and close of the stock price for the program's default time period. Volume for each period is shown at the bottom of the screen.

If you want to change the time span for the data shown, you simply press any number from 1 to 10 to display 1 to 10 years of data, or you can press the function key that corresponds to the number of months of data you want. The Telescan database contains information back to January 1973. You can display the full history of a stock by simply pressing the equal sign key.

Menus are displayed adjacent to the stock graphs at all times and list the keys you must press for each available feature. From the main menu that appears next to each chart, you can choose several submenus that will allow you to change or calculate various technical and fundamental indicators.

Any Indication

You can also select six technical indicators from the main menu: moving average, cycle analysis, momentum, on-balance volume, relative strength, and trend line marker. You have six fundamental indicators with which to analyze stocks: book value, dividends, earnings, cash flow, capital spending, and a composite of these five fundamental indicators. Three additional indicators you can use are adjustment for inflation, insider trading, and short interest.

Moving averages is one of the most popular techniques for analyzing stock and market trends. These averages smooth out price fluctuations, thus making trends easier to identify. Using *Telescan*'s moving average feature, you can graph one or two standard or exponential moving averages over a specified time. You can also graph the difference between the moving average and the closing price or the difference between any two moving averages. The resulting oscillator graphs can identify buy and sell signals wherever the curve crosses the neutral line.

A cycle analysis plots the cycles of stock prices to determine when a stock might peak or bottom out.

On a color monitor, each moving average is shown in a different color, making it easy to pick out buy and sell signals.

A cycle analysis plots the cycles of stock prices to determine when a stock price might peak or bottom out. *Telescan* can display a stock graph with a sine curve overlaid. It can expand or contract the sine curve, shift it up, down, left, or right, and increase or decrease its amplitude. *Telescan* can also indicate, at the bottom of the screen, the period of the cycle and the dates for the top and bottom of the next cycle.

The program calculates on-balance volume for the stock of your choice by adding volume to the previous value when the stock price closes higher than the previous price and subtracting volume from the value when the stock closes lower than the previous price. If the stock price falls to a new low and the on-balance volume line does not, the indicator is interpreted as positive. If the stock price rises to a new high and the on-balance volume line does not, the indicator is interpreted as negative.

Trendy Tools

A quick look at any stock chart will reveal that prices move in trends and that quite often a series of either top or bottom stock prices can be joined by a straight line. These lines, known as trend lines, are simple but important chart analysis tools; they are reliable about 80 percent of the time in predicting reversals in stock trends. A reversal in a stock trend is indicated when daily stock price averages go signifcantly above or below the appropriate trend line.

You create trend lines using the arrow keys; you can move a marker right, left, up, and down until you get to the point you want to mark. After marking two tops or two bottoms, you press a function key and the trend line is drawn through the two marked points.

Book value per share is a company's net worth divided by the number of shares outstanding; the book value ratio

is the stock price divided by the book value per share. *Telescan*'s book value analysis allows you to plot the book value ratio showing the highest and lowest values for the time span chosen.

Telescan lets you retrieve and plot graphic information with consummate ease and speed.

You can quickly identify when a stock is undervalued, that is, selling below its book value.

Telescan uses the highest and lowest ratios of stock price to book value to draw overvalued and undervalued lines on the stock graph. The resulting screen shows clearly the stock's actual value against its book value.

Dividend yield is the current stock price divided by the sum of the last four quarters of dividends. The dividend yield choice in *Telescan*'s dividend submenu displays the dividend yield history for the stock you are examining.

Telescan will also display the history of a company's price/earnings ratio—its current stock price divided by the sum of the previous four quarterly earnings per share.

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Insider trading is an important factor to consider when you're weighing a stock's value because insider buying and selling often precedes major stock price movements, thus making these graphs of particular value to investors.

While on-line, you can save the graphs to disk so that viewing and analysis can be done off-line when you are not paying connect-time charges.

Telescan lets you retrieve and plot graphic stock information with consummate ease and speed. Its menus are always visible, and you have one-keystroke control for virtually every function. The combination of technical and fundamental analyses make *Telescan* a valuable tool for any investor. ■

Thomas A. Meyers is founder and president of the American Association of Microcomputer Investors.

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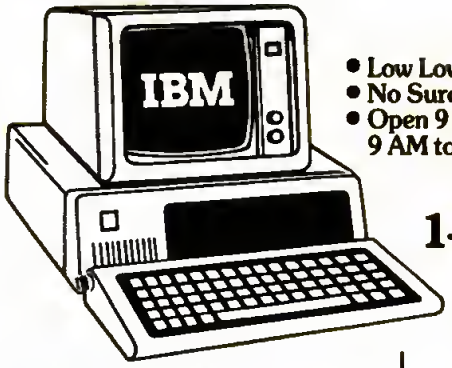

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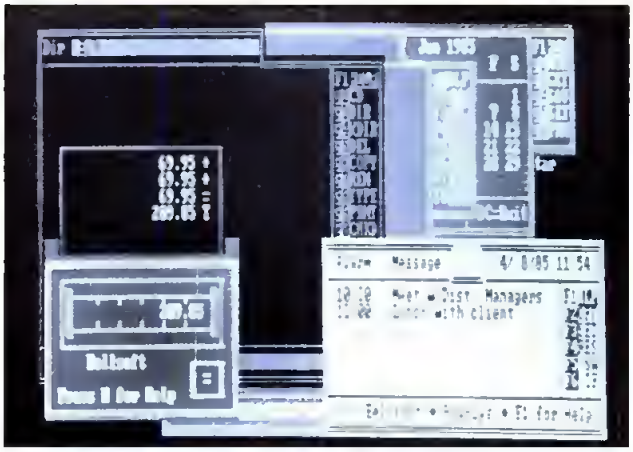
ORGANIZERS

Bellsoft, Inc. has introduced a series of low-cost, memory-resident programs called **Pop-Ups** with features not normally found in low-cost desk organizer software. Chief among these features is the software's ability to place a copy of DOS within a user-defined RAM partition. This RAM DOS access function, called *PopDOS*, permits the user to interrupt an application to run DOS commands, other *Pop-Up* modules, or other applications software, then return to the first application at the point of departure.

The various *Pop-Up* modules are available separately or as an integrated *Pop-Up DeskSet* or *Pop-Up DeskSet Plus* package. The modular approach permits the user to add only those functions needed, avoiding the memory penalty associated with keeping rarely used functions within a RAM partition. Separately, the modules include:

• *PopDOS*—Performs DOS commands from within an application. This module includes *Pop-Up Anything*, a window-based menu for accessing other *Pop-Up* functions or other applications programs.



Pop-Up DeskSet, Bellsoft, Inc.

• *Pop-Up Notepad* with *Pop-Up Clipboard*—An on-screen text editor with a cut-and-paste facility allowing the user to capture up to one screen of data at a time for transfer to another application.

• *Pop-Up Calculators*—Two separate calculators, each equipped with ten memories and a printable tape. The standard calculator function features percentage calculations and a dollar mode and can transfer its figures directly into an application. The extended financial/statistical calculator adds routines and modes for handling interest, annuities, loan amortization, standard deviation, correlation, and more.

• *Pop-Up Calendar*—Displays either scrollable 3-month calendars or detailed 1-month calendars with important dates noted, for any year from 1900 to 2027. It can note appointments, holidays, or special events, track cyclic events, print calendars, and date-stamp applications.

• *Pop-Up Alarm Clock*—Provides up to six alarms with a message for each, and a repeatable five-minute "snooze" option. It can display the time each minute, each hour, constantly, or not at all. It can work silently or sound a tone each hour. It also offers a multiple-event stopwatch and can time-stamp applications for log-keeping purposes. Lastly, this module can do timed "feeds" of commands to cause DOS or an application to perform tasks unattended at user-specified times.

• *Pop-Up Voice*—Dials telephone numbers from the keyboard, a stored phone list, or a database file without exiting the application on-screen. This function, included with the *DeskSet Plus* package, is presently not compatible with the IBM PC AT or PC*jr*.

(List Price: Pop-Up DeskSet, *$69.95;* Pop-Up DeskSet Plus, *$129.95; separate* Pop-Up *modules, $19.95-$39.95, depending upon functions)*

Requires: 128K RAM (more recommended), one disk drive, PC-DOS 2.0.

Bellsoft, Inc.
2820 Northup Way
Bellevue, WA 98004
(206) 828-7282

CIRCLE 633 ON READER SERVICE CARD

Potomac Industries's **DiskPorter** is a portable diskette holder that also serves as a copy stand. The slim-profile storage case can be mounted on a wall or stored in a desk drawer. As its name implies, it can also

New on the Market Submissions Guide

Owing to the high volume of new product materials received each week at *PC*, all submissions to New on the Market should follow these guidelines:

1. Include the retail price and details of both hardware and software needed for an end-user to properly use your new product. This includes required amount of RAM, number and type of drives, operating systems supported, and peripheral equipment needed.
2. Releases should be typewritten double-spaced on one side of the paper. Copies of advertisements may be included, but in most instances we need more information than is typically included in an ad. Include telephone contacts for marketing and technical questions.
3. If available, include black & white glossy photos of the product, 4 × 5 inches or larger.

New on the Market does not review products; do not send sample or demo copies of software. All product announcements are run on a space-available basis, at the exclusive discretion of the editor. Please note that it is impossible to guarantee publication of a product announcement for any particular issue.

be carried in a briefcase. Its stair-step design ensures that each disk's label remains visible, allowing the user to access the correct disk without rummaging through the entire collection.

Flipping back the DiskPorter's clear plastic cover converts the storage unit into a convenient desktop copy stand, allowing maximum use of available desk space. Two index cards can be inserted within the clear cover for indexing the enclosed disks.
(List Price: $29.95)
Potomac Industries, Inc.
2300 M St. N.W., #400
Washington, DC 20037
(202) 955-9797

CIRCLE 632 ON READER SERVICE CARD

ACCESSORY EQUIPMENT & SUPPLIES

Golden Bow Systems has announced a new IC chip permitting users of the Iomega Bernoulli Box to boot their PC systems directly from the cartridge drive. The chip, designated the **FiXT/B PLUS**, also permits the use of standard PC-DOS fixed disk commands with the Bernoulli Box, and cartridges can be partitioned for non-DOS use. The FiXT/B PLUS chip can be installed on the Iomega Host Adapter for IBM PC, PC-XT, and PC AT use.
(List Price: $95)
Golden Bow Systems
3368 Second Ave., #F
San Diego, CA 92103
(619) 298-9349

CIRCLE 631 ON READER SERVICE CARD

Uninterruptible power for the IBM PC AT is being offered by American Power Conversion Corp. in its **Model 450AT+** standby power system. The 450AT+ incorporates an internal, self-charging sealed battery capable of running an enhanced PC AT and monitor at full load for up to 15 minutes should a full or partial power blackout occur. During normal operation, the unit provides line power surge protection and EMI/RFI filtering. Its master power switch can be used to control all attached equipment.
(List Price: $799)
American Power Conversion Corp.
89 Cambridge St.
Burlington, MA 01803
(617) 273-1570

CIRCLE 630 ON READER SERVICE CARD

The **Protech** line of security devices from I.T. WORX provides equipment protection with an internally mounted alarm system that is activated when a system is moved. The piercing 85 dB alarm sounds for user-defined periods of up to 22 hours after activation, automatically resetting itself after each foiled attempt at theft.

The Protech devices are available in self-contained or plug-in board configurations, each with its own battery. Options include a key switch for equipment frequently moved and a cabinet interlock kit for securing the internal components of a protected system.
(List Price: $89.95)
Integrated Technology WORX
1173 Pittsford-Victor Rd.
Pittsford, NY 14534
(716) 385-5640

CIRCLE 629 ON READER SERVICE CARD

Protech Alarm Systems, Integral Technology WORX

PRINTER UTILITIES & EQUIPMENT

Users of the Okidata 92/93 dot matrix printers can access a range of print features without installing "Plug 'n Play" chips with the **Superoki Software Package**. Among the advantages provided by the software is the retention of several Okidata print features that are normally lost with the "Plug 'n Play" chips.

The *Superoki Software Package* permits such features as 96-character lines, downloadable character sets, and rapid setting of such print parameters as margins, tabs, print size, and line spacing. Graphics screens can be dumped to the printer much as text screens can, with a sideways print dump also possible. Graphics images are printed in up to four shades of black and white in a 320 × 200 dot resolution mode.
(List Price: $36)
Requires: 64K RAM, one disk drive, PC-DOS, Okidata 92 or 93 printer.
Dr. Milton Rosenberg
84-50 169th St., #509
Jamaica, NY 11432
(718) 657-3019

CIRCLE 628 ON READER SERVICE CARD

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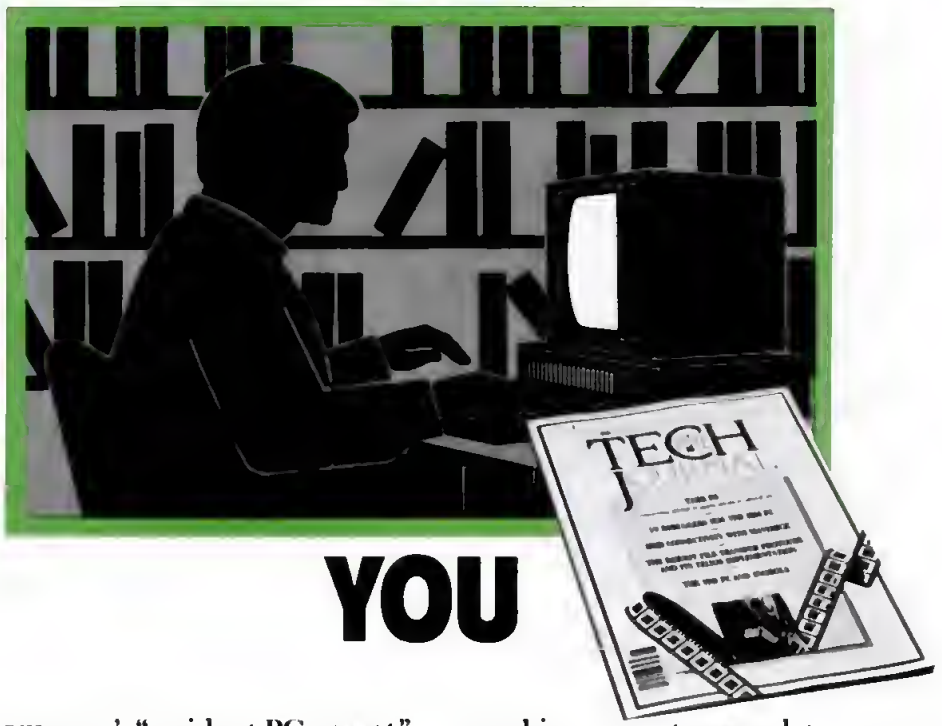

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Written for IBM PC Experts by IBM PC Experts.

8Z300

SETHP from Orbit Enterprises allows users of the Hewlett-Packard LaserJet to invoke the printer's features using single keystroke commands. The utility supports a range of LaserJet font cartridges and permits such print parameters as the number of lines per inch or page, the number of copies to be made, and automatic line wrapping to be set from either the software's menus or from the DOS command line. This latter feature allows the utility to be accessed by batch files for automated printing.
(List Price: $49.95)
Requires: 64K RAM, one disk drive, PC-DOS, HP LaserJet printer.
Orbit Enterprises, Inc.
1 S. 726 Danby Dr.
Glen Ellyn, IL 60137
(312) 469-7167

CIRCLE 627 ON READER SERVICE CARD

***Model UNI2 Printer Stand,** Bretford Manufacturing, Inc.*

Bretford Manufacturing has announced a printer stand constructed of heavy steel with adjustable width and depth brackets to accommodate any printer. The unit, **Model UNI2**, also offers four extension brackets, a wire paper bale, and three adjustable shelves for organizing different sizes of paper and forms.

The stand can hold any printer up to a maximum width of 31½ inches and a depth of 15⅜ inches.
(List Price: $195)
Bretford Mfg., Inc.
9715 Soreng Ave.
Schiller Pk., IL 60176
(312) 678-2545

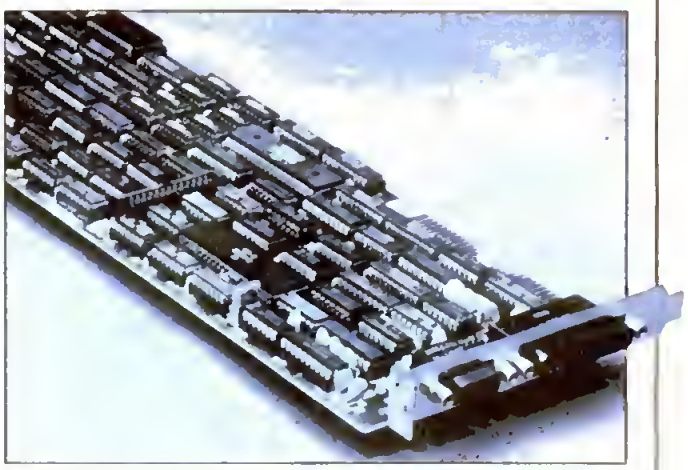
CIRCLE 626 ON READER SERVICE CARD

For users of small desktop printers, Disconsin Business Products has released the **Model TG-10 Desktop Printer Stand**. The heavy steel-wire stand permits the user's printer, paper supply, and printout bale to occupy the same desk space as the printer alone.
(List Price: $39)
Disconsin Corp.
15 Court Sq., #100B
Boston, MA 02108
(617) 523-1128

CIRCLE 625 ON READER SERVICE CARD

GRAPHICS

San Diego-based Vutek Systems is offering an RGB color/graphics video card incorporating both a parallel and a serial communications interface. Designated the **Vutek CPS Card**, the board



***Vutek CPS Card,** Vutek Systems, Inc.*

is compatible with the IBM Color/Graphics Adapter, and Epson or other Centronics-interface printers or plotters. The board's serial port can be used with a range of serial digitizers, digital mice, and other input devices.
(List Price: $299)
Vutek Systems, Inc.
8911 Complex Dr.
San Diego, CA 92123
(619) 569-0092

CIRCLE 624 ON READER SERVICE CARD

PC users wanting to create monochrome screen graphics without a color/graphics card might consider the **Monographx** program from Analytics International. Unlike other graphics programs, *Monographx* does not require color, though it will support color/graphics adapters and monitors if present.

The software uses both function keys and pull-down menus to aid the user in creating organizational diagrams, flow charts, and Gantt charts. It offers a choice of 19 different fill patterns and allows text to be mixed freely with graphics images.

Images can be moved, mixed, or saved independently at will, within or across files. An Undo command permits accidental erasures to be recovered easily.

Created images can be printed with a graphics dot matrix printer. Compatible printers include the IBM Graphics Printer, Epson FX/MX series with Graftrax, C. Itoh Prowriter, and the Okidata 92, 93, and 84 with "Plug 'n Play" chips.

An included on-line tutorial, *TeachMe*, contains six lessons on creating graphics.
(List Price: $49.95)
Requires: 128K RAM, one disk drive, PC-DOS 2.0.
Analytics International, Inc.
17 Oakland Ave.
Arlington, MA 02174
(617) 641-0400

CIRCLE 623 ON READER SERVICE CARD

HOME-ORIENTED PC PRODUCTS

Horse-racing fans might like to take a look at Software Exchange's **Thoroughbred & Harness Racing Handicapping** software consisting of three separate programs, *Thoroughbred Racing Analysis*, *Harness Racing Analysis*, and *Bet Return Analysis*, all of which are accessible from a single menu. The three programs are able to operate with only a minimum of statistics found in daily racing forms.
(List Price: $29.95)
Requires: 64K RAM, one disk drive, PC-DOS.
Software Exchange
2681 Peterboro Rd.
W. Bloomfield, MI 48033
(313) 626-7208

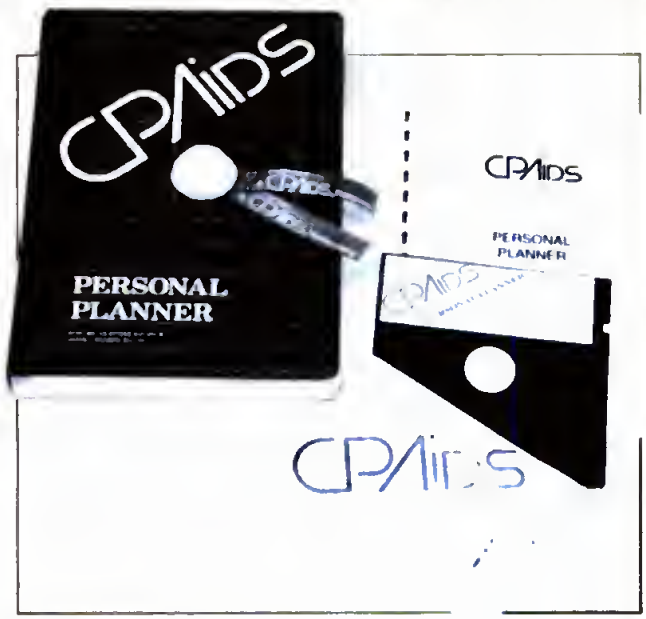
CIRCLE 622 ON READER SERVICE CARD

CPAids, Inc. has released a financial data management package for home use called the **Personal Planner**. The program can calculate tax liabilities for 1984–1987, organize all relevant tax data into an easily retrievable form, and aid the user in such tasks as retirement planning, investments, IRA contributions, home buying, two-income planning, and verifying federal tax forms.

For any given year, the Personal Planner stores up to four different sets of assumptions about an individual's financial status. The program can project expected income into the future and show the long-term implications of current financial decisions. For example, the program can help the user determine whether it would be better to take payment for the sale of a property in one sum or as a series of installments over a period of years.

Most of the commonly used federal income tax forms and schedules have been incorporated into the software, permitting the user to determine earned income credit, itemize deductions, and perform other tax preparation calculations from data that is stored in its files.
(List Price: $49)
Requires: 64K RAM, two disk drives, PC-DOS.
CPAids, Inc.
1061 Fraternity Cir.
Kent, OH 44240
(216) 678-9015

CIRCLE 621 ON READER SERVICE CARD



***Personal Planner*, CPAids, Inc.**

COMMUNICATIONS

Electronic Vaults, Inc. has introduced the **UPTA 96 Modem** series, a line of 9,600 bits-per-second modems in both standalone and plug-in board configurations that fit short or full-size expansion slots in the user's PC. The modems can operate asynchronously over dial-up phone lines, or connect directly to PC-Mainframe network installations via RS-232 lines.

The UPTA 96 modems offer half-duplex operations at 9,600, 7,200, and 4,800 bps, and feature autodial, autoanswer, and Hayes command compatibility. Internal firmware supports a proprietary Ensured Data Integrity (EDI) protocol that makes use of numerically sequenced data packets and cyclic redundancy checks. Additionally, the UPTA 96 modems feature automatic "fallback" to 7,200 or 4,800 bps under noisy line conditions, with automatic adaptive equalization.

Both modems currently in the series are compatible with communications programs that can operate at 9,600 bps and use the Hayes "AT" commands. The UPTA 96 Integral is designed to fit the expansion slots of the IBM PC for PC-to-PC communications. The UPTA 96/S is the standalone model that connects to either PCs or mainframes via RS-232 ports.
(List Price: UPTA 96 Integral, $795; UPTA 96/S, $895)
Electronic Vaults, Inc.
8350 Greensboro Dr., #714
McLean, VA 22102
(703) 883-0331
(703) 883-0332

CIRCLE 620 ON READER SERVICE CARD

Miracle from Micro-Systems Software provides an integrated, multifunctional approach to PC-mainframe communications. Incorporating word processing, spreadsheet, and graphics functions, the software permits the user to download data from mainframe systems and manipulate the data without leaving the program. The various functions can be accessed via multiple windows through the software's *Agenda* command system. This command system also permits the user to "teach" the software repetitive tasks for automating operations.

UPTA 96 Modems, Electronic Vaults, Inc.

Miracle's ability to "learn" tasks is further enhanced by *PAL*, a built-in procedural language that permits the user to enter complex operations as a command file. With *PAL* commands, *Miracle* can do such tasks as access an on-line database, search for data via user-defined criteria, and retrieve the data in a format compatible with the software's spreadsheet, word processing, or graphics components, without user intervention.

The software's spreadsheet component offers worksheets of 256 rows by 64 columns; up to four of these worksheets can be opened concurrently through screen windows. This allows the user to create three-dimensional worksheet configurations with advanced mathematical, trigonometric, statistical, financial, logical, and calendar calculations available.

Miracle's graphics component offers two-color palettes or monochrome fill patterns for creating pie charts, bar graphs, area graphs, and high-low-close investment graphs. Both the spreadsheet and graphics components can make use of the built-in word processor for producing complex reports incorporating numerical graphs. After manipulation, the communications component permits the data to be uploaded to any system on-line.

(List Price: $299)
Requires: 256K RAM, two disk drives, PC-DOS 2.*x*.
Micro-Systems Software, Inc.
4301-18 Oak Cir.
Boca Raton, FL 33431
(800) 327-8724
(305) 391-5077

CIRCLE 619 ON READER SERVICE CARD

INPUT/OUTPUT DEVICES

Welch Allyn, Inc. has produced a bar code interface on a single half-size board that can be fitted in any IBM PC expansion slot without software or hardware modifications. The **HBD-100 Interface** board's 9-pin port accepts digital scanner input and automatically discriminates between five major bar codes: code 3-of-9, CODABAR, Interleaved 2-of-5, UPC, and EAN. Data entered into the user's system via the attached scanner appears to the user's application as keyboard input.

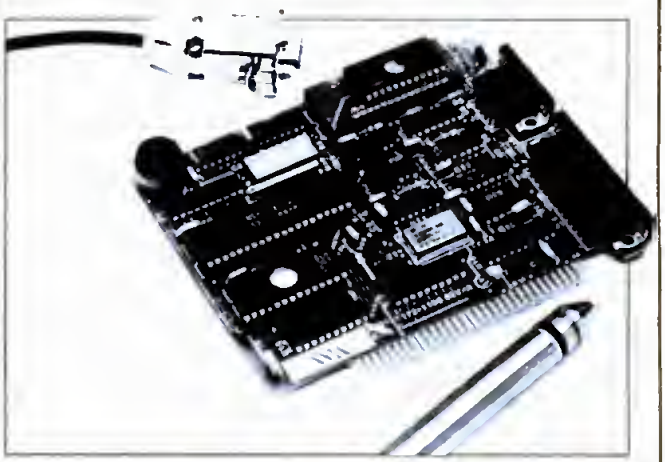
Among scanner choices also available from Welch Allyn are an infrared LED wand with high or low resolution and a visible light LED wand with high or low resolution. Bidirectional scanning speed ranges from 3 to 30 inches per second, depending upon the type of code. Additional options for the board include bar code printer and serial interfaces.

(List Price: With scanner, $695)
Welch Allyn, Inc.
Industrial Products Div.
Jordan Rd., Box 187
Skaneateles Falls,
NY 13153
(315) 685-8351
TWX: 710-685-0203

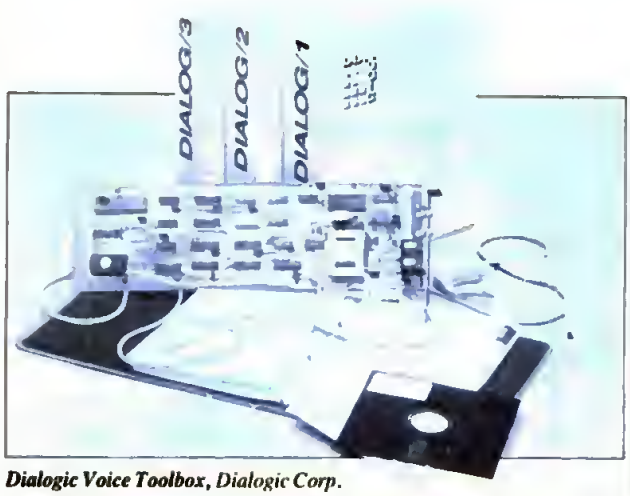
CIRCLE 618 ON READER SERVICE CARD

Dialogic Corp., makers of the DIALOG series of voice recognition and synthesis boards, has introduced a collection of software tools for making effective use of voice I/O in an applications system. Called the **Voice Toolbox**, the collection is comprised of five separate modules, available together or separately. These five programs include:

- *VBASE*—A program for the creation and management of a database consisting of words and phrases to be used by the DIALOG boards.
- *CallStat*—A program



HBD-100 Bar Code Interface, Welch Allyn, Inc.



***Dialogic Voice Toolbox**, Dialogic Corp.*

for monitoring phone line status during a call.

• *DIME (Dialogic Intelligent Modem Emulator)*—Allows the DIALOG boards to emulate the Hayes Smartmodems.

• *DOSTools*—An aid for quick development of voice I/O applications without regard to the programming language used.

• *SPTools*—A collection of utilities that perform various signal-conditioning operations on a voice file.

DIME and *CallStat* can only be used with the DIALOG/2 and DIALOG/3 boards because of the necessary communications functions built into these boards. The remaining modules in the *Dialogic Voice Toolbox* can be used with any of the DIALOG boards.
(List Price: All five programs, $150; separate modules, $50 each)
Requires: DIALOG series voice I/O board.
Dialogic Corp.
60 Baldwin Rd.
Parsippany, NJ 07054
(201) 334-8450

CIRCLE 617 ON READER SERVICE CARD

TEMPLATES, UTILITIES & PROGRAMMING

Riverdale Systems Design, Inc. has announced five template programs for Lotus's *1-2-3* as part of its **Hospital's Workplate** software series. The five programs are designed to automate various aspects of hospital administration and performance evaluation. The individual templates in the package include the following titles:

Hospital's Market Analysis Workplate templates analyze the demographic characteristics of the region surrounding the hospital. Additional capabilities allow for projections of hospital use based on various indicators, the exploration of population methodologies, and the application of national averages to the particular region.

The *Hospital's Medical Staff Workplate* analyzes the characteristics and use patterns of the institution's medical staff. Quartile analyses identify the most-active physicians; other studies correlate patterns of hospital use with various physician characteristics. The template also aids in pinpointing the regionwide availability of medical specialties and can provide projections of needed medical staff under various "what if" scenarios.

The third release, the *Hospital's Utilization Workplate*, analyzes historical use trends and projects future use. Inpatient, ambulatory care, and ancilliary services are studied for up to 5 years, with detailed analyses for single-year periods. Special reports are also generated for selected tertiary services.

The *Hospital's Departmental Planning Workplate* aids in the operational planning of each department's space needs. Utilization levels are surveyed and ratios applied to provide guidelines by department, outlining the space required given the number of procedures and treatments to be performed.

The fifth program, the *Hospital's Financial Projections Workplate*, helps to determine the financial outlook of the institution for a period of up to 5 years. The templates produce profit-and-loss/income statements, cash flow analyses, and balance sheets, allowing the institution to compare its performance to that of others.
(List price: Market Analysis, Medical Staff, and Hospital Utilization programs, $295 each; Departmental Space Planning and Financial Projections, $195 each)
Requires: 320K RAM, two disk drives, PC-DOS 2.*x*, Lotus's *1-2-3*, Ver. 1A.
Riverdale Systems Design, Inc.
3333 Henry Hudson Pkwy.
Riverdale, NY 10463
(212) 549-1692

CIRCLE 616 ON READER SERVICE CARD

FREE OR LOW-COST SOFTWARE

EDIT, a general-purpose text editor, has recently been placed in the public domain through the PC Software Interest Group of Sunnyvale, Calif. Features of this free program include global, selective, and conditional search-and-replace, page format control, and on-screen display of such formatting characteristics as boldface, underlining, and wordwrap. When used with PC-DOS 2.0 or later, *EDIT* also permits direct execution of DOS commands from within the program.

To obtain a copy of *EDIT*, contact PC-SIG at the address below and ask for disk 294. The program may be freely copied, and users are encouraged to share it with others. The author, whose name and address are available through PC-SIG, requests that satisfied users send a donation of $25.
Requires: 96K RAM, one disk drive, PC-DOS.
PC Software Interest Group
1030 E. Duane, #J
Sunnyvale, CA 94086
(408) 730-9291

CIRCLE 615 ON READER SERVICE CARD

PC BlueBook

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(415) 856-6833

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TJ SOFTWARE
PO. Box 2044
Arlington Heights, IL 60006
(312) 364-1065

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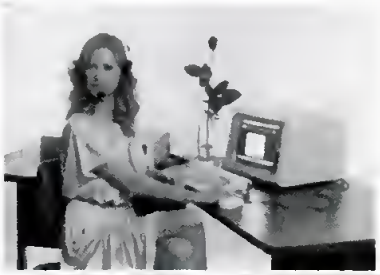

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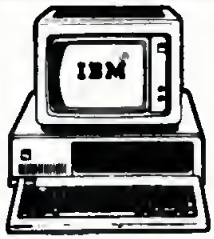

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Silicon Valley Days

Two new books, one a glowing history and the other a less-than-suspenseful espionage story, present two very different views of California's Silicon Valley.

It's a wonder any work gets done in Silicon Valley, what with all the self-satisfied techie millionaires counting their money. At least that's what you might think if you failed to give *Charged Bodies* a chance. At first, Thomas Mahon's hyperbolic portrait of California's high-tech wonderland is hard to swallow. His comparison of Silicon Valley's Renaissance to fifteenth-century Florence is dubious and his description of the Valley as a "state of mind" is overblown.

But if we accept the unabashed chauvinism that Mahon brings to his subject, it becomes easy to enjoy *Charged Bodies*. On first examination the book may appear simply to rehash the now-familiar profiles of the microcomputer industry's brightest entrepreneurs. Many of these people do figure in the story of Silicon Valley, but Mahon does not limit himself to the microcomputer world. He also reports on the extraordinary proliferation of scientific endeavor in the area and how it has dramatically affected and changed a once-pastoral community of plum and apricot growers.

PC FACT FILE

Charged Bodies: People, Power and Paradox in Silicon Valley
Thomas Mahon
NAL Books
1633 Broadway
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(212) 827-2000
Copyright: 1985
Cover Price: $15.95
ISBN: 0-453-00487-3

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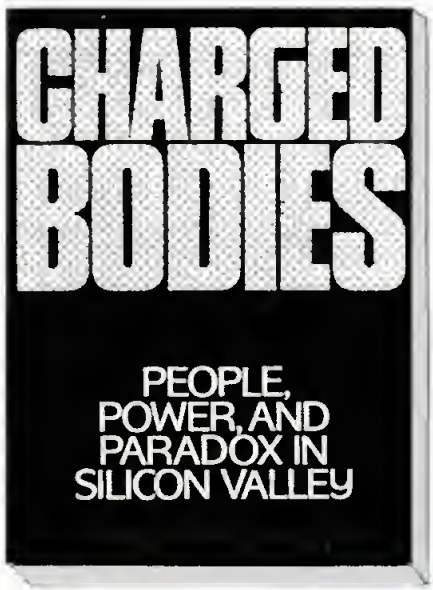
Silicon Implants

Although a few technological companies did locate in the northern Santa Clara Valley in the 1930s and 1940s (notably Hewlett-Packard), Mahon credits William Shockley with starting the heavy influx of scientific enterprises. Shockley grew up in the area and after leaving AT&T's Bell Labs in 1955, located his own semiconductor firm in Palo Alto. After a while, some of his engineers, including Robert Noyce, "defected" to form Fairchild Semiconductor. While at Fairchild, Noyce coinvented the integrated circuit. In 1968, Noyce and two colleagues left to found Intel, the company that is chiefly responsible for developing the microprocessor.



Mahon, a public-relations specialist in San Jose, adopts the style of a good investigative reporter and includes a variety of people and interests in *Charged Bodies*. After tracing the charter of Silicon Valley back to Fairchild, Intel, and other companies, he returns to the present to let those who live and work in the Valley have their say. Many of these people are involved in businesses that complement and support the early companies. Others are academics, observers, theologians, and even watchdogs alert to possible environmental or social abuses.

Give Me a Profile

In profiling these Valley-ites, Mahon provides background information, then lets his subjects speak for themselves. We benefit, therefore, from nontechnical explanations of, for example, the economic principles at play in venture capitalism, the basics of semiconductor theory, and the ABCs of genetic engineering. The people profiled have strong opinions and, to his credit, Mahon does not tamper with them.

In speaking about the business of venture capitalism, for example, financier James Anderson suggests that Silicon Valley backers are tied to technological companies by choice. Anderson is "emotionally married to high technology," he claims. "I think it's great fun. I don't think of it as a way of making money . . . money is simply the way we keep score."

But then we hear from Ted Smith, a lawyer whom Mahon labels an environmental activist, who is concerned about chemical pollution of the aquifer that supplies 60 percent of Santa Clara Valley's drinking water. Smith is worried about the social consequences of the Valley's transformation as well. "There are human casualties . . . whether it's Atari laying off nearly 2 thousand people with little or no notice, or the day-to-day grind of the production jobs. This is certainly one of the wealthiest areas in the world, yet the public school my first-grader went to last year closed due to a lack of sufficient money."

Mahon also pays tribute to the patriarchs of Silicon Valley. Leland Stanford probably had no idea that the university he started in 1840 would become a magnet for many of the country's most forward-thinking scientists. Frederick Terman, an eminent professor at Stanford since the 1930s, did much to guarantee that the university became a center of high technology. Terman tells the story of David Packard and William Hewlett, two of his students who started an electronics business in Packard's garage.

Charged Bodies is an easygoing book that offers science, history, business, popular culture, and even some music and art. Thomas Mahon clearly did extensive research and, wisely, talked to many people before he sat down to write. But I'm not yet ready to concede that Silicon Valley is a state of mind. It's simply a pleasant place with a great climate where a lot of very smart people have put their heads together.

Espionage in the Silicon Valley

It would be great to recommend *Espionage in the Silicon Valley* as an antidote to the largely optimistic *Charged Bodies*. This slim Sybex paperback by John D. Halamka tries to show the seamier side of a world that is usually depicted as a land of opportunity for quick-witted entrepreneurs. However, some people also make impressive, if illicit, fortunes by stealing trade secrets and products from the companies owned by those entrepreneurs. Little attention has been paid to these thefts, even though they frequently result in exciting sting operations and dramatic trials.

In *Espionage in the Silicon Valley*, Halamka explains that the type of crime afflicting high-technology companies is a new strain that cannot be fought by traditional law-enforcement methods. For one thing, the atmosphere in which products are designed and developed is highly volatile. Big money is at stake, and pressures are almost unbearable. Competition is so stiff in Silicon Valley that even a day's delay in a schedule can jeopardize a product's success.

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These adverse circumstances can work together to make a company particularly vulnerable to theft, often from within its own walls. But such a company may be reluctant to invest in an adequate security system, an expense they may view as unnecessary overhead. Taking precautions against a theft problem is an admission that the problem exists. A company that is on shaky financial ground doesn't want to frighten stockholders or alert competitors.

Local Yokels

Halamka goes on to explain that because of the nature of the products involved, local police may not be equipped to participate in the normal way. Perhaps they don't fully understand the value of the stolen materials.

Silicon Valley crimes are often fraught with suspense and international intrigue. Millions of dollars may change hands under a table. There's even been one known murder. A book that compiles and analyzes some of these real-life whodunits should be a spellbinder. Unfortunately, *Espionage in the Silicon Valley* is an unsatisfying example of the genre.

Halamka first offers an overview of the problem in a brief introduction. The information that he presents here about the production of microchips and the kinds of things that can go wrong is useful and interesting. However, the main part of the book that follows, case studies of five crimes committed against Silicon Valley companies in the last decade, is almost impossible to follow and overwhelmed by unnecessary detail. The facts are disjointed and sometimes don't add up. The text is wearisome.

Espionage in the Silicon Valley is poorly edited and riddled with typographical errors. Its dense design makes it difficult to read. Surely more editorial attention could have been given to this potentially compelling subject. ■

Terry Nasta is a technical writer for Informatics, a large software development company in New York City.

PC FACT FILE

Espionage in the Silicon Valley
John D. Halamka
Sybex
2344 Sixth St.
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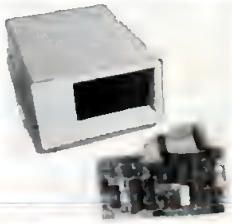

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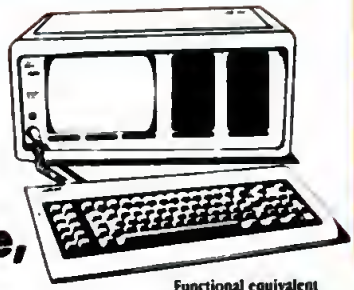

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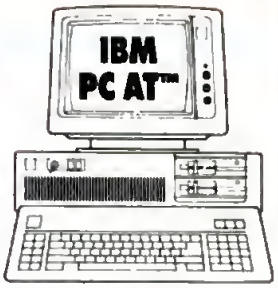

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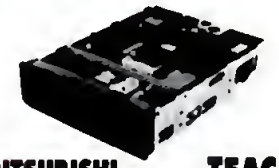

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This is a Super Special promotion. It was supposed to end around the end of May.

But we decided to buy more than 1,000,000 3M diskettes packed in the FREE Flip n' File 15's...and give you the benefits of this terrific value.

One word of warning: **this offer is limited only to supplies on hand. Once these supplies are used up, the prices stay the same...but there's no free Flip n' File.**

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Other 3M diskettes:

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100% certified 3M data cartridges.

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Dust free storage for 70 5¼" diskettes Six dividers included An excellent value **$11.68** $3.00 Shpng

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The original flip up holder for 10 5¼" diskettes Beige or grey only **$1.65** ea 20¢ Shpng

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Coming Up

Word Processor Roundup

In the 4-year history of the IBM PC, word processing software has appeared on the market at a staggering rate of nearly one package per week. Your purchasing decisions probably don't take this many products into account, but the sheer number of packages on the shelves make word processor shopping a confusing experience. In this issue, *PC Magazine* evaluates 18 of the most popular PC word processors, ranging from one $10 gem to a few several-hundred-dollars behemoths. We'll take you through a typical word processing day at the keyboard with each program and then compare and chart its features as well as tell you how fast it performs the most-common tasks. Writer Phil Wiswell ties it all up with some of his own conclusions.

And More Word Processing

Word processors that can automatically index and generate a table of contents save writers both time and money. Dara Pearlman compares three powerful word processors, *Word Perfect 4.0*, *XyWrite II Plus*, and *WordStar 2000 Plus*, according to their ability to perform these two laborious and painstaking tasks.

Price Waterhouse Report

The spreadsheet can be a logical and efficient tool for handling small-scale accounting needs. *CPA+* is a *1-2-3* template package that makes spreadsheet accounting a breeze. It integrates four major accounting functions: general ledger, accounts payable, accounts receivable, and payroll management.

LANs on a Disk

LANLink and *EasyLAN* are new products that combine special software with your general-purpose RS-232C hardware to give you local-area networking abilities at lower-than-LAN prices. *PC Magazine* tells you how one of these might just be the product to meet your office networking needs.

Sanyo Portable Computer

What's better than a PC-compatible transportable microcomputer? A PC-compatible transportable microcomputer with a built-in color/graphics monitor, that's what. The Sanyo MBC-775 is this and more. We'll tell you if it's ready for business—and for travel.

New Columns

Upcoming issues of *PC Magazine* will feature two new regular columns: "Quantum Leap," by Ron Jeffries, and "Computers in Society," by Stan Augarten.

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If you believe these simple facts about hard disks, you'd be willing to pay more for ours.... fortunately, you won't have to

Avoiding hard disk failures and loss of data is just one of the reasons to buy our hard disks.

Hard disks can fail—there's really no other nice way to say it. Even IBM has problems delivering ATs with hard disks that work. We're not talking about nice, clean, clear-cut failures where the drive seizes up, coughs, and rolls over and dies. We're talking about the insidious little creeping failures that sneak up over time—like a missing sector here or a lost sub-directory there.

There are precautions you can take to protect against failure and ultimate loss of data. Here is what we contribute toward minimizing the potential loss of your data.

Best Drives Available

First, we buy the best drives available. Sounds trite, doesn't it? I mean, a drive's a drive—right? Hardly. You should see some of the junk we get in our labs. Some have such high failure rates that we even questioned our own $10,000 hard disk tester. But when we tested other manufacturers' drives we were assured that our equipment was fine, which just confirmed that the bad hard disks were not only bad—they were real bad.

But that's just the weeding out process. We then take each drive that we've put through our tester and test it again with the controller you've requested. We call this a "tested pair."

DOS Doesn't Do It

In case you're thinking that all this is an unnecessary duplication of what DOS does for you, let me explain the disk facts of life.

If DOS did what you may think it is supposed to do when you format the disk, DOS would map around these bad areas. Unfortunately, DOS doesn't do this.

DOS 2.0 and 2.1 can't enter the bad tracks. DOS 3.0 can, but only on the IBM AT. Unfortunately, as the press has so well documentated, the AT's hard disk develops bad tracks later on.

We do what DOS can't

We believe the problem is so bad, we use a software program that performs a powerful test of your disk drive on all of the IBM or IBM compatible computers—PCs, XTs, and ATs. Our format takes hours to analyze the disk. But when we finish, you know that the bad tracks are really mapped out so you won't write good data that will disappear into a black hole. We even send you a printed statement of our test results.

Our software allows you to type in the bad track locations from the list supplied by the manufacturers, so you'll never write good data to them—even if DOS didn't identify them as bad. The software even lets you save the location of these bad sections to a file, so that you can reformat your disk without spending hours retesting.

We even include a program that will give you continuous comments on the status of your hard disk. No more waiting for that catastrophic failure.

Average Access Time

As you might suspect, some hard disks are faster than others in their ability to move from one track of data to another. The time it takes the hard disk to move one-half way between the beginning of the disk to the end is called the "average access time."

The first generation of 10 megabyte hard disks had average access times of 80-85 milliseconds (msec). But computer users love speed, and guess what—the average access time for the new 20 megahyte hard disk in the IBM AT is only 40 msec. (We sell an AT equivalent with only 30 msec access time!)

There are some legitimate reasons for the shorter access time. It's particularly helpful when there are multiple users on the same hard disk. It's also important when running a compiler. But remember, before you get too wrapped up in the access speed, there's always that ST 506 interface which won't let data transfer from the hard disk to the computer any faster than 5 megabits/second. We've bypassed that choke hole, too. If you want the functional equivalent of a Ferrari with a turbocharger, order our 10 Mbit per second 108 megabyte hard disk with 18 msec of average access speed.

Compatibility

To be sure that your hard disk is 100 percent compatible with the IBM XT you don't need to buy the same hard disk that's in the XT. You can't even be sure what brand hard disk it is because IBM, like Express Systems, goes into the marketplace and buys hard disks from several vendors. However, they buy their XT hard disk controller from only one vendor—the same one we do.

You can buy the IBM XT controller from IBM for $495 or you can buy from us, the functional equivalent, manufactured by the same company that makes it for IBM for only $195. Is it the exactly identical IBM XT controller? No, it's better. First, it takes less power, and secondly, it can control from 5 to 32 megabytes—the IBM controller can work with only 10 megabytes. It is 100 percent IBM XT compatible, and 100 percent is 100 percent. If you want to save a slot, we carry a version that lets you operate two hard disks and two floppy disk drives.

More than 32 Megabytes

You can operate with more than 32 megabytes (the limit of DOS) through the use of "device drivers." Express Systems can supply you with device drivers for our hard disks for over 32 megabytes formatted. But, if you don't have individual files, or databases that are large, you might want to consider one of our controllers that can divide our 65 megahyate (formatted) hard disk into two equal volumes of 32 megabytes each.

Reliability

We offer you a choice between iron oxide and plated media—the stuff that covers the hard disk and gives it its magnetic properties. Iron oxide is,—well, it's rust. If you inadvertently joust your disk, you may cause the low flying head to dig out some iron oxide. A little rust flake can ruin your whole day. Plated media is more resistant to damage, and if it happens, less data is lost.

We offer both types of hard disks. The iron oxide is older

technology, and quite frankly, manufacturers understand it better. Their better understanding, combined with some of the special head locking mechanisms, gives us peace of mind when we sell you one.

Power

Hard disks consume power. Our small, half-high hard disks consume so little power that you can use them with your existing IBM PC power supply. If you plan to use lots of slots, you'll want to increase your power supply to be safe. We offer the same amount of power for your PC that comes in the XT.

Our Customers

Some folks just never feel comfortable buying mail order. They forget that Sears began as a mail order house or that IBM is now into mail order. But, if it helps, here is a *partial* list of customers who have felt comfortable to buy from us.

IBM	Sears
American Express	Honeywell
U.S. Army	MIT
AT&T (Bell Labs)	RCA
Bausch & Lomb	Lockheed
Xerox	Sperry

Easy to Install

If you're like most of us, raised on the boob tube rather than the Great Books, you'd rather see the movie than read the book. Well, now you can choose to read our installation manual or for only $9.95 more, you can get a VHS or Beta video cassette showing the simple steps for installation.

Our VHS or Beta Cassettes make installation easy.

Warranty

We offer you a one year warranty on our hard disks—the same as IBM on the AT and 90 days on the tape drives. (It's all the manufacturer gives us.) If anything goes wrong with your tape or disk drive or hard disk, send it back in the box it came in. However, we have found that we can usually solve the problem over the phone. So call first for a return authorization number because we can't accept any returns without it.

Complete Hard Disk Kits

Formatted Storage Capacity in Mbytes	Height	Plated Media	Average Access	Transfer Rate	PC or PC/XT	AT
10	½	yes	85 msec	5 Mbits/s	$ 625	$ 430
10	Full	yes	85 msec	5 Mbits/s	$ 625	$ 430
21	½	yes	85 msec	5 Mbits/s	$ 825	$ 630
21	Full	no	30 msec	5 Mbits/s	$ 1,535	$ 1,340
32	½	yes	85 msec	5 Mbits/s	$ 1,095	$ 895
32	Full	no	30 msec	5 Mbits/s	$ 1,775	$ 1,575
65	Full	no	30 msec	5 Mbits/s	$ 2,295	$ 2,070
108	Full	yes	18 msec	10 Mbits/s	$ 4,995	$ 4,995

Removable Hard Disk

10	½	no	90 msec	5 Mbits/s	$ 1,095	N/A

Tape Systems and Subsystems

Formatted Storage Capacity	Height	Data Transfer Rate (k-sec)	PC or PC/XT	AT
60 Mybytes	½	88	$ 995	$ 995
60 Mbytes Subsystem		88	$ 1,295	$ 1,295
17.6 Mbytes Start/stop Subsystem		24	$ 795	$ 795

Controllers

All of our hard disk and tape controllers are available separately: Please call for prices.

Subsystem Chassis

Any of our disk or tape units are available in an external subsystem for an additional $250.00. You can mix & match any of our ½ high hard disks or tape drives together or add any single full height hard disk

Tape Cartridges — $ 35.00

Express Certified 555 foot 310 Hci ¼-inch Data Cartridge

Power Supply — $ 99.50*

130 Watt Power supply
*with the purchase of any drive

Comes complete

All Express Systems products come complete with the appropriate software, tape and/or hard disk controllers, and cables where required. Hard disks are formatted and tested with the PC DOS of your choice. All drive sizes are formatted capacities.

If your application requires a stacking kit, power splitter cables, daisy chain cable, or some other variation, we'll supply these items at a nominal charge. We even ship our hard disks with Command Assist™ an on- line DOS-like manual to give you help with your DOS commands.

More questions?

Because we spend so much attention on the front end with ensuring that our disks will arrive in working order, we have a customer service department that, unlike many of our competitors, has little to do. When you need us, you won't get a constant busy signal.

Call our friendly, knowledgable customer service staff to get answers to your questions—before or after the sale. Our people, who know the PC, can talk you through the sticky parts, and they'll respond to you quickly. Just call us.

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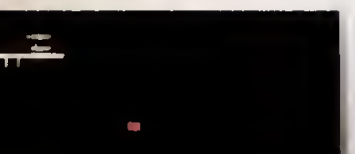

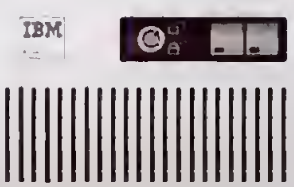

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VERSAPAYABLES™ $99.95

VERSAPAYABLES™ is designed to keep track of current and aged payables, keeping you in touch with all information regarding how much money your company owes, and to whom. VERSAPAYABLES™ maintains a complete record on each vendor, prints checks, check registers, vouchers, transaction reports, aged payables reports, vendor reports, and more. With VERSAPAYABLES™, you can even let your computer automatically select which vouchers are to be paid.

VERSAPAYROLL™ $99.95

VERSAPAYROLL™ is a powerful and sophisticated, but easy to use payroll system that keeps track of all government required payroll information. Complete employee records are maintained, and all necessary payroll calculations are performed automatically, with totals displayed on screen for operator approval. A payroll can be run totally automatically, or the operator can intervene to prevent a check from being printed, or to alter information on it. If desired, totals may be posted to the VERSALEDGER II™ system.

VERSAINVENTORY™ $99.95

VERSAINVENTORY™ is a complete inventory control system that gives you instant access to data on any item. VERSAINVENTORY™ keeps track of all information related to what items are in stock, out of stock, on backorder, etc., stores sales and pricing data, alerts you when an item falls below a preset reorder point, and allows you to enter and print invoices directly or to link with the VERSARECEIVABLES™ system. VERSAINVENTORY™ prints all needed inventory listings, reports of items below reorder point, inventory value reports, period and year-to-date sales reports, price lists, inventory checklists, etc.

VERSALEDGER II™ $149.95

VERSALEDGER II™ is a complete accounting system that grows as your business grows. VERSALEDGER II™ can be used as a simple personal checkbook register, expanded to a small business bookkeeping system or developed into a large corporate general ledger system **without any additional software.**

- VERSALEDGER II™ gives you almost unlimited storage capacity (300 to 10,000 entries per month, depending on the system),
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- prints tractor-feed checks,
- handles multiple checkbooks and general ledgers,
- prints 17 customized accounting reports including check registers, balance sheets, income statements, transaction reports, account listings, etc.

VERSALEDGER II™ comes with a professionally-written 160 page manual designed for first-time users. The VERSALEDGER II™ manual will help you become quickly familiar with VERSALEDGER II™, using complete sample data files supplied on diskette and more than 50 pages of sample printouts.

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The mass memory market has become a real battle zone! Chaos, confusion and buyer uncertainty have resulted from too many products and not enough answers.

The truth of the matter is, anyone can sell a winchester disk drive. The problem is that hard drives, by their own nature, are sensitive devices that require appropriate handling and customer support.

Don't be mislead into believing that a disk drive can be sold and booted around the country, without any risk.

There is no room for the weak, when it comes to delivering a product you can depend on!

Peachtree Technology inc. has cleared the path of confusion with a comprehensive line of mass memory expansion systems that have established themselves as leaders in advanced hard drive technology, backed by strong customer support. Every Peachtree Technology inc. product has been through stringent diagnostic testing as a complete system. To assure they not only meet, but surpass specifications. (On the outside of every box is a documented certificate of inspection signed by our technician). Plus we stand behind our products with a complete one year parts & labor warranty.

FLEXIBILITY AND COMPATIBILITY A MUST!
To eliminate frustration, Peachtree Technology inc. has provided a complete line of mass memory storage systems. They are fully compatible with IBM PC, XT, & PORTABLE, AT&T, CORONA PORTABLE, COMPAQ DESK PRO & PORTABLE, COLUMBIA, TAVA, ZENITH 150 AND MANY MORE. (If your computer is not listed, please contact us for further information).

We offer a complete line of products including:

- External winchester hard drives • 10, 20, and 30 megabyte (formatted capacity). Our 10 and 30 megabyte drives utilize a hard carbon coating on the disk platter surface.
- Internal mounted winchester hard drives • 10, 20 and 30 megabyte (formatted capacity)
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